LNHS

THE LONDON NATURALIST

Journal of the
LONDON NATURAL HISTORY SOCIETY

No. 84 2005

LONDON NATURAL HISTORY SOCIETY

The Society welcomes new members, both beginners and experts. Its recording area (the London Area) lies within a 20-mile (32-km) radius of St Paul's Cathedral and here most of its activities take place. Although much covered with bricks and mortar, it is an exciting region with an astonishing variety of flora and fauna. The Society comprises Sections whose meetings are open to all members without formality. For those interested in arachnology, archaeology, botany, conchology, conservation, ecology, entomology, geology, herpetology, mammalogy, ornithology, palaeontology, or rambling, there is a Section ready to help.

Publications

The London Naturalist, published annually, contains papers on the natural history and archaeology of the London Area and beyond, including records of plants and animals.

The *London Bird Report,* also published annually, contains the bird records for the London Area for each year, as well as papers on various aspects of ornithology.

Bulletins of news items, including the Society's *Newsletter* and the *Ornithological Bulletin,* are sent to members throughout the year.

Indoor meetings

These are held in most weeks throughout the year, with lectures, discussions, colour slides and films on all aspects of natural history.

Field meetings

Led by experts to visit interesting localities, both within and outside our Area. These excursions are very popular with beginners wishing to increase their knowledge, and enable members to get to know one another.

Library

A large selection of books and journals on most aspects of natural history is available for loan or consultation by members free of charge.

Reading circles

Many important natural history journals are circulated by the Sections at a fraction of the cost of subscribing direct.

SUBSCRIPTIONS

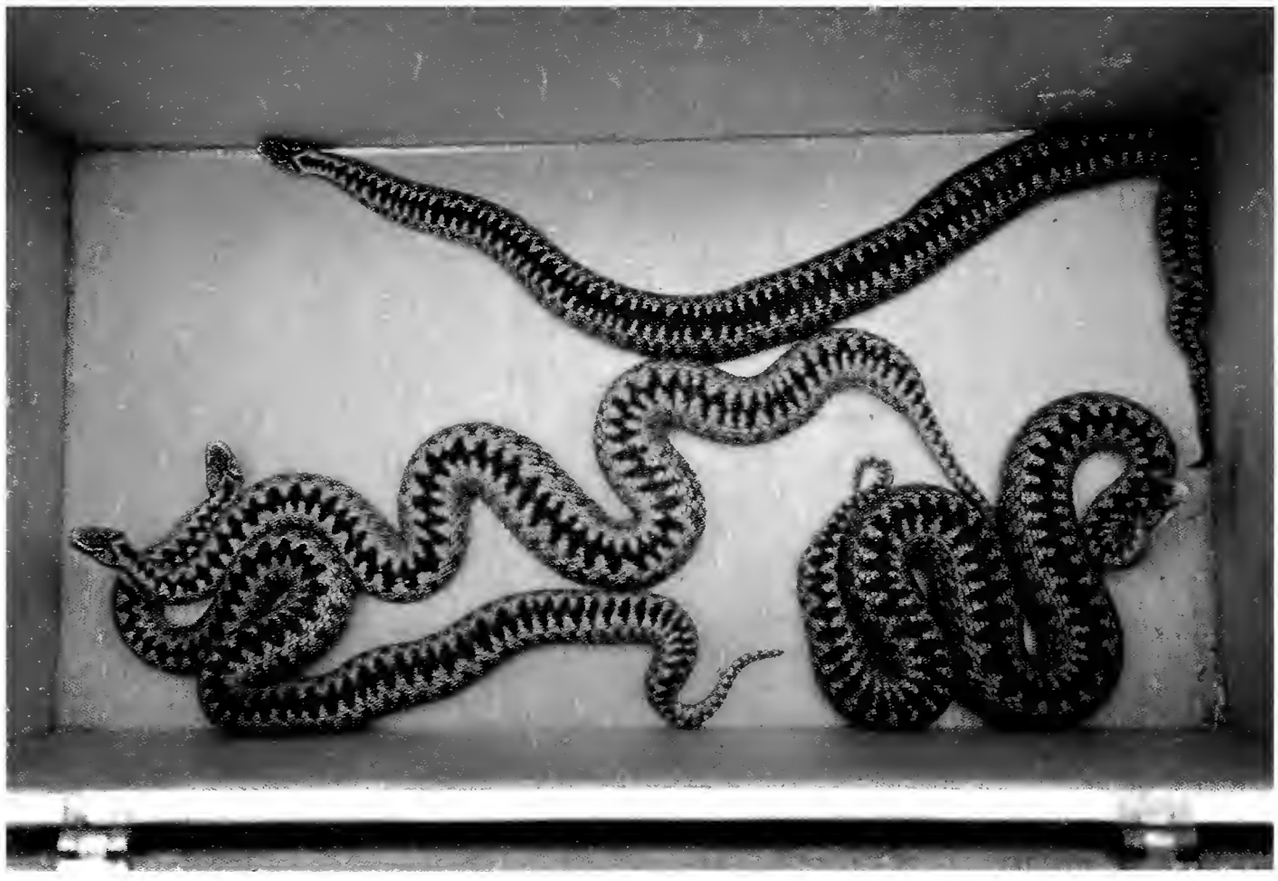
ORDINARY MEMBERS	£20.00
JUNIOR MEMBERS	£5.00
SENIOR MEMBERS	£16.00
FAMILY MEMBERS	£4.00
CORPORATE SUBSCRIBERS	£20.00

Junior membership is for persons under 18, or under 25 and receiving full-time education, and senior membership is for persons over 65 who have been continuous members of the Society for ten complete years. All except family members receive one free copy of *The London Naturalist* and the *London Bird Report* each year. Cheques and postal orders, payable to the London Natural History Society, should be addressed to:

The Assistant Treasurer, LNHS,
Robin Blades,
32 Ashfield Road, London N14 7JY

THE LONDON NATURALIST

Further copies of this issue of *The London Naturalist* may be obtained (price £8 plus £1 postage and packing in the UK and the Republic of Ireland) from Catherine Schmitt, 4 Falkland Avenue, London N3 1QR. Back numbers of most recent issues of both *The London Naturalist* and *London Bird Report* are also available from the same address. Cheques should be made payable to the London Natural History Society.



Top: Adult female adder. *Photo: Graeme Skinner*

Bottom: Adders in a corner. Translocation has played a significant role in preventing the extinction of the adder in Greater London. *Photo: Tom Langton*

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LONDON NATURAL HISTORY SOCIETY

Founded 1858

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10 Vivian Row, London E3 5RF

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Editor, *London Bird Report:* A. Self, 16 Harp Island Close, London NW10 0DF.

Editor, *Newsletter:* G. Lyall, 15 The Esplanade West, Sunderland SR2 7BG.

Editor, *Ornithological Bulletin:* N. Tanner, 11 Collins House, Newby Place, London E14 0AX.

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† Deceased July 2005

†† Deceased September 2005

The Society's Recorders

Botany

Flowering plants and vascular cryptogams: R. M. Burton, MA, FLS, Sparepenny Cottage, Sparepenny Lane, Eynsford, Dartford, Kent DA4 0JJ (01322 863216).

Lichens: Ms A. J. H. Waterfield, B.SC., 29 Gloucester Crescent, London NW1 7DL (020-7267 8060).

Fungi: Prof. E. G. D. Tuddenham, 17 Bedford Road, London N22 7AU (020-8374 5167).

Bryophytes: M. C. Sheahan, PH.D., 61 Westmoreland Road, London SW13 9RZ (020-8748 4365).

Ecology and Entomology

Mammals: C. Herbert, 67a Ridgeway Avenue, East Barnet, Hertfordshire EN4 8TL (email: armconservation@hotmail.com).

Reptiles and amphibians: T. E. S. Langton, B.SC., 12 Millfield Lane, London N6 6RA (email: t.langt@virgin.net).

Fishes: Dr Ruth Kirk, School of Life Sciences, Faculty of Science, Kingston University, Penrhyn Road, Kingston upon Thames, Surrey KT1 2EE (email: r.kirk@kingston.ac.uk).

Arachnida: J. E. D. Milner, B.SC., 80 Weston Park, London N8 9TB (email: spiders@acaciaproductions.co.uk).

Coleoptera (Carabidae and Coccinellidae): P. R. Mabbott, B.SC., 49 Endowood Road, Sheffield S7 2LY (email: paulmabbott@blueyonder.co.uk).

Coleoptera (Lucanidae and Buprestidae): Dr D. S. Hackett, FRES, 3 Bryanstone Road, London N8 8TN (email: danielhackett@blueyonder.co.uk).

Coleoptera (families not otherwise listed): M. V. L. Barclay, 47 Tynemouth Street, London SW6 2QS (email: m.barclay@nhm.ac.uk).

Lepidoptera (butterflies): L. R. Williams, 34 Christchurch Avenue, Kenton, Harrow, Middlesex HA3 8NJ (email: leslie.williams1597@btinternet.com).

Lepidoptera (moths), Syrphidae, and invertebrates not otherwise listed: C. W. Plant, B.SC., FRES, 14 West Road, Bishops Stortford, Hertfordshire CM23 3QP (email: cpauk1@ntlworld.com).

Orthoptera: Vacant.

Hymenoptera Aculeata: R. W. J. Uffen, 4 Mardley Avenue, Welwyn, Hertfordshire AL6 0UD (01438 714968).

Heteroptera: Vacant.

Odonata: Neil Anderson, B.SC., 52 Beechwood Avenue, Greenford, Middlesex UB6 9UB (email: neil@anders42.freeserve.co.uk).

Plant galls, Isopoda and Myriapoda: K. Hill, BA, FLS, 93 Elmhurst Drive, Hornchurch, Essex RM11 1NZ.

Mollusca: Vacant.

Records may be sent to the appropriate recorder (where shown) or to Colin Plant who will distribute to each recorder the relevant data from a mixed set of records.

Geology

Vacant.

Ornithology

Inner London: D. Darrell-Lambert, 33 Mary Rose Close, Chafford Hundred, Essex RM16 6LY.

Hertfordshire: A. D. D. Wilson, 7 Douglas House, Davison Drive, Cheshunt, Hertfordshire EN8 0SZ.

Buckinghamshire: A. V. Moon, 46 Highfield Way, Rickmansworth, Hertfordshire WD3 2PR.

Kent and Lower Thames (London Bridge to Tilbury): Vacant.

Surrey and Upper Thames (London Bridge to Staines): Vacant.

Middlesex: R. E. Innes, 27 Dominion Close, Hounslow, Middlesex TW3 1PJ.

Contents

Report of the Society for the year ending 30 June 2004

Approved at the Annual General Meeting on 7 December 2004

The title of Jan Hewlett's Presidential Address in December 2003 was 'The changing face of nature conservation in London, 1946–2003' in which she referred to the increased interest in wildlife and its conservation and to the growing number of organizations devoted to biodiversity. Mindful of these changes, Council acted on two fronts, consulting members on how they would like the Society to develop and also beginning the process of revising the Society's constitution.

The consultation began in February with Members' Day, an open meeting at Barn Elms Wetland Centre organized by the president. From the lively discussion, two key conclusions emerged: the Society's greatest asset is its tradition of voluntary recording, which complements the remit of larger organizations with paid staff; on the other hand it needs to attract more young people and those from London's ethnic minorities and to teach them identification skills. A brief report on these and other issues appeared in the *Newsletter*.

Greater cooperation with, for example, London Wildlife Trust (LWT), is both desirable and achievable, aided by the Society's participation in the London Biodiversity Partnership (with a seat on the Partnership's Project Board). A separate body, Greenspace Information for Greater London (GIGL) has been established as a local node of the National Biodiversity Network, initially under the auspices of LWT, to receive, collate and disseminate species and habitat records for the area. Council is considering how best to transfer the Society's huge stock of species records to the GIGL database whilst maintaining security of sensitive records and ensuring our members are properly credited for their efforts.

Since the last review of the Society's constitution twenty-five years ago there have been radical changes in London governance. This, and the higher profile accorded to nature conservation (such as requirements to assess the environmental impact of new developments) persuaded Council to consider revising the Society's rules. A further impetus is the prospect of a new Charities Bill. Already, under existing legislation and guidelines for good governance, many charities have revised their structure, for example by moving to a smaller governing body. Various options are being considered by a Working Group of Council. Any changes will need the approval of the Charity Commissioners as well as the membership at an AGM. Comments and suggestions are welcome and should be addressed to the secretary.

Membership and communication

Total membership at 30 June 2004 was 997, hardly changed since last year despite the increase in subscription rates. Factors that contributed to stemming the decline of recent years include the assistant treasurer's robust and effective management of the membership database, and the new full-colour publicity leaflet. A good way to reach prospective members is via the mailing lists of like-minded organizations, and during the year the LNHS and the John Muir Trust carried out reciprocal mailings of leaflets. Members can help by asking to put our leaflet on display in their local libraries and community centres, and at relevant exhibitions and conferences. Supplies are available from the librarian.

Under its new editor, Graeme Lyall, the *Newsletter* had what in Fleet Street jargon would be called a relaunch. There was apprehension that the introduction of colour and a staple-bound magazine format would be too expensive but such are the economies of computer-based publication that

Graeme has produced a very attractive product within the existing budget. For many members the *Newsletter* and the *Programme* booklet are their main links with the Society but the website, managed by David Corcoran, is fast catching up. Most Sections now have their own web pages, and ideas for development are welcome. For example, would a web-based index to articles in *The London Naturalist* and *London Bird Report* be of interest?

On a sadder note, we must record the deaths of several members who have given valuable service to the Society, including Ben Aris, Captain Sir Thomas Barlow, Margaret Blackley, Miss Evelyn Brown, Enid Butler, John Crosland, E. H. Down, Laurence Green, Ralph Hale, Peter Lees, Graham Myers, Ken Osborne, Bill Park, and Peter and Joan Williams. Evelyn Brown was our president in 1971 and 1972. Her main interests were the wildlife of Holland Park, and the conservation and recording of birds in London. These topics were the subjects of her Presidential Addresses which appeared in *The London Naturalist* **51** and **52**. Evelyn had been a member of the Society since 1950 and was made an honorary vice-president in 1972. Following her retirement she moved to Nottingham. Ralph Hale was our longest-standing member, having joined the Society in 1927. Early on he was chairman and secretary of the Ornithology Section but in 1947 he became the Society's librarian, a post he held until 1956. In 1953 Ralph oversaw the removal of our library and collections from the London School of Hygiene and Tropical Medicine in Keppel Street to new premises in Eccleston Square. He was made an honorary vice-president in 1976 and eventually retired to Leicestershire. Evelyn and Ralph were in their nineties when they died. Obituaries of Ken Osborne and Bill Park will appear in *The London Naturalist*.

Publications and journals

Council has been greatly concerned about late publication of the *London Bird Report*. Officers worked closely with the editor, Andrew Self, and his team, to identify the reasons — a combination of obsolescent recording software, delayed returns from some Vice-County Recorders, and time needed for the new editorial team to 'bed in'. All are being addressed but one has to ask whether the size and scope of the *LBR* has increased beyond the resources of a small volunteer society. No. 65, for 2000, was published to its usual high standard in mid 2004 while No. 66 should appear early in 2005. The aim of publishing within twelve months of the recording period remains but may not be easy to achieve.

There are fewer scheduling constraints on *The London Naturalist,* No. 82 of which appeared in December 2003. However, like the *LBR,* its size is restricted by the budget it can be allowed and the editor, Keith Hyatt, sometimes has to hold over contributions until the next year. Since members receive both the *LN* and the *LBR* there may be a case for transferring all ornithology papers to the *LN* and reserving the *LBR* purely for the systematic lists and species accounts, within the same overall budget for journals. Members' views are welcome.

One of our members, Clare Coleman, is preparing a new edition of Francis Rose's *Wild Flower Key*, a classic field guide for aspiring botanists. Council granted the publishers, Penguin Books, permission to use some illustrations from Rodney Burton's *Flora of the London Area*, of which the Society holds copyright. The opportunity to help develop identification skills was welcome, the agreed fee equally so. Stocks of the *Flora* are now exhausted but Catherine Schmitt, publications sales officer, reports buoyant sales of other back issues, especially Colin Plant's *Butterflies of the London Area* and *Larger Moths of the London Area*.

Research stations

The **Bookham Common Survey** began in 1941, making it one of Britain's longest-running records of changes to a natural habitat. For many years the Survey had no premises from which to operate. In 1964 the Society erected the

first 'Bookham Common Hut', replacing it with a second of similar size in 1989. As reported last year, damage to the roof, a need for more space, and a reorganization by the National Trust of the warden's outbuildings led to a decision to replace this hut with a larger one. The generous response of members to the appeal in memory of Ruth Day, and contributions in cash and kind from the National Trust, allowed a high-quality building to be purchased. The new hut was ready for use in the summer and by the time this report appears will have been formally opened.

The Survey's chairman, Ian Menzies, and the National Trust's local team have begun regular on-site meetings to discuss proposed work such as scrub clearance in light of the Society's detailed records of species sites. Also, Society members led by Alison Fure have recommenced the surveys of small mammals. A trapping survey has begun of dormice at sites across the Common, with permission from English Nature.

In contrast, the **Hampstead Heath Survey** is not involved in management work on the Heath. This is amply taken care of by the Hampstead Heath Consultative Committee with representatives from the numerous, and vocal, local organizations. The Heath Survey is well provided with brick-built accommodation, but although attendance at monthly meetings is maintained there are currently rather few capable of identifying some of the more difficult taxa on the Heath.

Sections

Field meetings of the **Botany** Section included three devoted to Local Change, a national scheme to survey selected tetrads and identify changes in their flora (and if possible the causes) since the last survey in 1987–8. It is good that the LNHS is involved in such exercises which can be carried out at least as well by volunteer societies as by contracted naturalists. The structuring of such surveys, however, may best be done nationally, as for example in ornithology where the oversight role of the BTO or WWT in such surveys led the Ornithology Section to disband its Research Committee.

The Botany Section appointed a new fungus recorder, Ted Tuddenham, while both the **Ornithology** and the **Ecology and Entomology** Sections have new chairmen, David Darrell-Lambert and Colin Bowlt respectively. David Greeno is the new treasurer of Ecology and Entomology. This Section's annual Brad Ashby Memorial Lecture was delivered as usual at a joint meeting with the British Entomological and Natural History Society. A joint meeting ensures a good audience and is a practice that might be more widely adopted. Sectional meetings are necessarily often specialized, for example where identification is the theme, but Council believes there is also demand for lectures and meetings on topics of general interest to the Society's members and is consulting on how to achieve this within the Sectional structure.

Sections have again been active in publicizing the Society and marketing its publications, for example at Lee Valley Bird Fair and at the Amateur Entomologists' Society exhibition. No doubt more could be done in this direction if volunteers can be found. Fuller reports on the activities of the Research Stations and Sections are published in *The London Naturalist.*

Library

One hundred and five books were added to stock on the advice of the Library Committee, some of them acquired from dealers' catalogues and second-hand shops which are a good source of books relevant to London. The forty or so members who hold library cards borrowed about 200 items during the year, and many others signed in as visitors to study reference material. Linda Hewitt, our librarian, acknowledges several donations which enabled some gaps to be filled, especially in runs of journals. She is, as usual, most

grateful to the staff at Imperial College for their help and support throughout the year.

The librarian's office at the College also houses the Society's archives. A notable addition was a set of CDs containing sound recordings of the complete proceedings of the Society's Centenary Exhibition (1958) and Symposium (1976), as well as two episodes of the TV series *The Living World* (November 1996, on the wildlife of London, and July 1998, on Buckingham Palace Garden). Only some older members will remember the voices of Messrs Bangerter, Castell, Teagle and others, while those of Jan Hewlett and David Bevan are familiar to most of us. We are indebted to Pat Sellar for transcribing these historic recordings from audio cassette to the more accessible medium of CD.

Conservation and biodiversity

David Bevan, conservation officer, represents the Society on the Project Board of the London Biodiversity Partnership. LNHS is the lead organization in the Action Plans for ecological monitoring in the generic area 'Habitats and Species'. Council's view is that the Society's Sections are well-placed to 'trial' proposed schemes, especially in relation to species monitoring — the Action Plan for mistletoe, including surveys of associated species, being a good example.

Mention has been made of GIGL, London's new Records Centre. Its existence, and its remit to act as a local node of the National Biodiversity Network, invites the questions, what, and how, should the Society record? Should surveys note every species, no matter how common? Rodney Burton points out that earlier botanical recorders virtually ignored shepherd's needle, then a common weed. Now that it is almost gone, there are few reliable records of where it once was. And what database should replace the card index? As with most new technologies, competition will ensure that only some of those on offer — Recorder, Cobra, Mapmate, etc. — survive. But which one? Our Society, with its limited resources and volunteer effort, has to take these questions seriously. Council intends to cooperate with GIGL and its sponsor, the London Wildlife Trust, in seeking grant funding for projects to address these questions.

In conclusion, members are reminded that those named in this report are only a small fraction of the many who in various ways help the LNHS achieve its charitable objectives. Our Council, Sections and Committees could not function without their support, for which we thank them. This is your Society, and offers of assistance are always greatly appreciated.

Members of Council (the Trustees), 1 July 2003 – 30 June 2004

N. Anderson
A. J. Barrett*
K. F. Betton
D. Bevan
R. A. Blades* (Assistant Treasurer)
Dr C. Bowlt
M. Burgess
R. M. Burton*
R. E. Butler
Ms A. Chipchase
Ms N. A. Duckworth*
Dr J. A. Edgington* (Secretary)
R. S. R. Fitter
Mrs L. Hewitt
Dr J. F. Hewlett* (President)
P. C. Holland
K. H. Hyatt
A. J. Leppard*
Dr I. S. Menzies
D. J. Montier*
R. M. Payne
C. W. Plant
Mrs C. M. Schmitt
A. Self
P. J. Sellar
R. A. Softly
Miss F. J. Turtle
M. J. West* (Treasurer)
H. M.V. Wilsdon*

*Members of Administration and Finance Committee as at 30 June 2004.

Treasurer's report for 2003/2004

At the end of the financial year on 30 June 2004, the total net assets of the Society were £342,358, compared with £324,352 the previous year, representing an increase of around 5.5 per cent.

Income for the year totalled £34,474, compared with £34,548 in 2002/2003. Subscription income (including Gift Aid tax recovered) at £19,913 was above the previous year's figure of £15,822, following an increase in subscription rates in January 2004. Sales of the Society's various publications generated £2,931, compared with £9,073 in the previous year when *The Breeding Birds of the London Area* was newly published. Investment income fell from £7,824 to £3,093, reflecting a change in the mix of the investment portfolio and the disposal of listed Investments as outlined below.

During the year under review the Society disposed of its entire portfolio of listed investments on the closure of Govett Investment Management Ltd, who had previously managed the portfolio. This resulted in a gain on disposal at market value of £13,526 (compared with a loss on disposal of £29,774 in the previous year). The proceeds were reinvested in the COIF Charities Deposit Fund pending decisions on longer-term investment. The balance held in this fund amounted to £311,000 at the year end, having generated £4,848 interest in the period.

Overall expenditure during the year was £29,994, compared with £57,136 in the previous year, mainly due to lower publication costs (including slippage in the production cycle of the *London Bird Report*, which is now being remedied) and efforts to reduce costs in all areas where possible.

Reserves policy

The Society's unrestricted general funds can be regarded as expendable endowment since they are invested to provide a regular source of income as well as capital growth.

Statement of trustees' responsibilities

Law applicable to charities in England and Wales requires the trustees to prepare financial statements for each financial year which give a true and fair view of the charity's financial activities during the year and of its financial position at the end of the year. In preparing those financial statements the trustees are required:

- to select suitable accounting policies and then apply them consistently
- to make judgements and estimates that are reasonable and prudent
- to state whether applicable accounting standards and statements of recommended practice have been followed subject to any departures disclosed and explained in the financial statements
- to prepare the financial statements on the going concern basis unless it is inappropriate to presume that the charity will continue to operate.

The trustees are responsible for keeping accounting records which disclose with reasonable accuracy at any time the financial position of the charity and enable them to ensure that the financial statements comply with the Charities Act 1993. They are also responsible for safeguarding the assets of the charity and hence for taking reasonable steps for the prevention and detection of fraud or other irregularities.

Summarized accounts for the year ended 30 June 2004

These summarized accounts have been extracted from the Society's annual accounts for 2003/2004. They may not contain sufficient information to provide a full understanding of the financial affairs of the Society. For further information the full accounts, the Independent Examination report on these accounts and the trustees' annual report should be consulted. Copies can be obtained from the Hon. Treasurer, M. J. West, 52 Trinity Road, Ware, Hertfordshire SG12 7DD.

The annual accounts were approved by the trustees on 14 October 2004.

Summarized statement of financial activities for the year ended 30 June 2004

	Unrestricted general funds 2004 £	2003 £
Incoming resources		
Activities in furtherance of the charity's objects:		
Subscriptions received from members	19,913	15,822
Publications/journals income	2,931	9,073
Interest receivable	5,271	194
Investment income	3,093	7,824
Donations and other income	3,266	1,635
Total incoming resources	**34,474**	34,548
Resources expended		
Costs of generating funds	(1,194)	(2,156)
Net incoming resources available for charitable application	33,280	32,392
Costs in furtherance of the charity's objects:		
Publications and other costs	23,673	47,846
Management and administrative expenses	5,127	7,134
Total resources expended	28,800	54,980
Net incoming (outgoing) resources before revaluations and investment asset disposals	4,480	(22,588)
Gains/(losses) on investment assets	13,526	(29,774)
Net movement in funds	18,006	(52,362)
Fund balance brought forward at 1 July	324,352	376,714
Fund balance carried forward at 30 June	£324,358	£324,352

Balance sheet as at 30 June 2004

	2004 £	2003 £
Fixed assets		
Tangible fixed assets for use by charity	3,741	1,174
Investments at market value: listed	—	262,078
cash	—	51,706
	3,741	314,958
Net current assets (including cash deposits)	338,617	9,394
Total net assets	£342,358	£324,352
Represented by:		
Unrestricted funds	£342,358	£324,352

Official and sectional reports for 2004

CONSERVATION

The Society continues to play an active role within the London Biodiversity Partnership, with your conservation officer representing the Society on the Project Board, and as a member of the Habitat, Species and Data Group, which coordinates the development of habitat and species action plans (HAPs and SAPs). LNHS members are actively participating in many of these plans. Two new ones were launched during the year, covering 'built structures' and 'reedbeds', and the Environment Agency have conducted an audit of London's 'rivers and streams', with a view to developing a full HAP for their protection and enhancement. Much progress was also made in taking forward earlier HAPs and SAPs during the review process. Details of all these plans can be found on the Partnership's recently expanded website at www.lbp.org.uk. One significant achievement was made by the Woodland HAP group, chaired by Dr Meg Game of the GLA, who were successful in their project planning stage application to the Heritage Lottery Fund, for the proposed 'Capital Woodlands' project. This is an ambitious undertaking, which seeks not only to improve the biodiversity of London's many woodlands, but also to increase people's understanding, enjoyment and participation in looking after them. Six London woods, widely distributed geographically, have been chosen as 'Flagships' to demonstrate best practice in woodland management, and at each of these a fully costed programme of work is being developed in consultation with local people. The conservation officer is responsible for managing one of these 'Flagships': Coldfall Wood in the London Borough of Haringey. The Capital Woodlands project also proposes a series of London-wide activities, including training in woodland management, which will be developed to celebrate woodlands across the capital. A full submission will be made to the HLF in May 2005.

In November 2004, the conservation officer contributed to two London region episodes of the BBC TV series: 'British Isles — A Natural History'. In the first, which covered the effects of the industrial revolution on the natural world, he discussed some of the plants which had benefited from the coming of the railways. The sequence was filmed on the Parkland Walk, a former railway line connecting Finsbury Park to Alexandra Palace, and now London's longest Local Nature Reserve. There was a fine display of Oxford ragwort growing along the top of a viaduct wall, allowing the classic story to be told of its original journey from Oxford to London along the railway system at the end of the nineteenth century. The second episode, which was filmed at Railway Fields LNR in Haringey, outlined the recent history of the site, and how it had been developed from a former coal yard. One highlight showed a recently emerged brimstone butterfly settled on its larval food plant, the alder buckthorn.

The Nature Conservation Working Group was busy this year undertaking survey work at Crane Park Island (a London Wildlife Trust Reserve), and at Tower Hamlets Cemetery Park.

Three survey meetings were held at Crane Park Island, where members helped to collect botanical records, as well as recording sightings of birds and invertebrates. These will contribute to the survey report, which is in preparation. Sightings of kingfishers, which are breeding on the reserve in an artificial kingfisher bank, were bonuses for those attending.

The meeting at Tower Hamlets Cemetery Park was a preliminary one, designed to test out recording forms and compartments, prior to further proposed visits in 2005.

At both places, the survey team were lucky to benefit from the expertise of a local person, with a deep interest in, and love of their site.

DAVID BEVAN, *Conservation Officer,* FREDA TURTLE, *Secretary, Nature Conservation Working Group*

BOTANY

In 2004 we had two formal meetings: in March David Bevan gave a talk on growing native wild flowers in the garden, and at the November AGM Trevor James of the National Biodiversity Network gave a talk on his organization (which was later printed in the Society's *Newsletter*, as much of it was of relevance to other Sections). Informal meetings started the year with the usual Best Botanical Slides evening and there were three useful identification meetings — one for grasses with Rodney Burton, one general botany with George Hounsome, and one for fungi with Ted Tuddenham and Keir Mottram.

The field meetings as usual were diverse and interesting. There was a winter workshop on mosses at the South London Botanical Institute in January, followed by a visit to look at mosses in Brookwood Cemetery the following month. In the spring and summer we went to Ranmore Common, sites round Seven Sisters in Sussex, Pinner Hill, Canvey Island, the Devonshire Road LNR, Shoreham (Sussex), the Thames towpath between Kew and Mortlake, Bow Back rivers, Epsom Common, Mitcham, the Paddock NR, the Hants. and Basingstoke Canal, Pegsdon Hill (these two joint with the Wild Flower Society), Walthamstow Marsh, Harefield Place, and the Haringey fungus survey (joint with London Wildlife Trust). In addition there were recording visits for the BSBI Local Change project to Knockholt and Hampton.

Our recorder for vascular plants, Rodney Burton, has added over 5,000 new records to his database this year, and dealt with eleven enquiries from consultants. In addition he has added 2,625 records to the BSBI database for their Local Change project, and written a report on it. Amanda Waterfield, our lichen recorder, has attended meetings on the GLA Churchyards and Cemeteries Action Plan, and on the effect of changing air quality on lichen distribution. Our new fungus recorder Ted Tuddenham has carried out a lot of collecting and identifying through the year, not just at the autumn fungus foray; he was also pleased to report that three new sites of regional importance for grassland quality had been noted in London, based on finding six or more species of waxcaps in a single visit. We are as always grateful to them, to those who organize our meetings, and to all who lead walks and indoor meetings.

Our thanks are also due to two members who have retired, having spent many years on the committee, Dorothy Brookman and Geoffrey Kitchener, and we welcome two new members, Jon Riley and Mark Spencer.

DAVID BEVAN, *Chairman*, MARY CLARE SHEAHAN, *Secretary*

ECOLOGY AND ENTOMOLOGY

During the year the Section arranged three indoor meetings in addition to the AGM. At our traditional informal meeting in February, members showed slides of geological, entomological and environmental interest and beauty. In April, John Bennett of Kent Wildlife Trust spoke to us about ' Taking care of Kent's Wildlife'. At our annual joint meeting with the British Entomological and Natural History Society in September, Edward Milner, our spider recorder, gave the Brad Ashby Memorial Lecture on 'Spiders in urban London'. At the Annual General Meeting in October, following reports from other recorders, Dr Ruth Kirk, recorder of fishes, fascinated us with an account of 'Alien Invaders: Part 2' about two parasites of fishes which she has been studying for twenty years.

Six field trips were organized during the year. In May Edward Milner, our spider recorder, led us to Horsendon Hill while two weeks later Derek Coleman led two trips over the one weekend, first for bats and then for moth trapping on National Moth Weekend. In June Freda Turtle led a tour of her

local nature reserve of Foxley Wood. July saw us with Neil Anderson at Runnymede for dragonflies and general natural history, and in December a group explored Hounslow Heath for spiders and general natural history.

We hope to have the Section's home page on the Society's website available by the time you read this. During the year we co-opted Colin Bowlt as chairman and David Greeno as treasurer to the Section. We still have a vacancy for indoor meetings secretary and we would welcome any members onto the committee willing to help with the work of the Section and the Society.

Once again the Section represented the Society at the Amateur Entomologists' Society exhibition, selling books and journals as well as making the work of the Society known to a wider public.

COLIN BOWLT, *Chairman,* CATHERINE SCHMITT, *Secretary*

ORNITHOLOGY

In 2004, the Ornithology Section continued to provide a varied programme of field and indoor meetings. There were four coach trips during the year: to Minsmere in January, to Holkham in February, to Cley in May and to Slimbridge in December. However, there has been a fall in support for field trips and new members especially are urged to participate, both for the variety of birds and the opportunity to learn in the field with an excellent leader. If we are unable to cover the cost of the outings, they may have to be suspended. For those who have not been, this is a summary of the birds seen and which will probably occur on these excursions but, as always with birds, there are no guarantees.

Minsmere RSPB Reserve. Eighty species including: red-throated diver, bittern, Bewick's swan, pink-footed goose, white-fronted goose, pintail; eider, common scoter, goldeneye, smew, red kite, marsh harrier, hen harrier, avocet, golden plover, lapwing, ruff, snipe, turnstone, six gull species including kittiwake, barn owl, kingfisher, water pipit foraging in front of a hide, stonechat, fieldfare, redwing, goldcrest, six tit species including bearded tit and marsh tit, nuthatch, treecreeper, four finch species including siskin. Muntjac deer, brown hare, rabbit and grey squirrel were also seen.

Holkham, Norfolk. Thousands of pink-footed and dozens of white-fronted and brent geese were in the fields by Holkham Park, and a probable Ross's goose in the distance, common scoter at sea, a flock of up to eighty snow buntings on the low salt marsh, skylarks singing overhead and a solitary twite. Treecreeper, coal tit, goldcrest and firecrest in pines behind the dunes. Fleeting glimpses of barn owl from the coach on the way home.

Cley, Norfolk. Eighty-four species including little egret, black swan, Egyptian goose, marsh harrier, sparrowhawk, red-legged partridge, water rail, oystercatcher, avocet, ringed, golden and grey plover and lapwing, knot, sanderling, Temminck's stint, curlew sandpiper, dunlin, ruff, black- and bar-tailed godwits, curlew, redshank, greenshank, common sandpiper, turnstone, six gull species including little and common gull, Sandwich, common and little terns, swift, skylark, sand martin, swallow, house martin, meadow and rock pipits, whinchat, four warbler species including grasshopper warbler heard and lesser whitethroat, bearded tit, linnet, reed bunting. Brown hare was also seen.

Slimbridge WWT Reserve, Gloucestershire. Seventy-one species including Bewick's swan, white-fronted goose, snow goose, tundra bean goose, peregrine, water rail, golden plover, lapwing; dunlin, ruff, snipe, black-tailed godwit, curlew, five gull species, green and great spotted woodpeckers, skylark, treecreeper.

There were many local field meetings — at least one a week — visiting the many hotspots around the capital. They were very ably organized by Jennifer Hayden, who again succeeded in cajoling more members into leading walks on their local patch. This is an excellent opportunity for members to discover new birdwatching areas and for the less experienced to receive help with identification. The section leaders can often also provide help with identifying flowers and insects: we do not limit ourselves to birds. Members can visit a different site every weekend, lead by enthusiastic, knowledgeable leaders. For example, Trent Park is an attractive site which has a variety of habitats. Robert Callf is a very good tutor for bird song and the group is encouraged to stop and listen to the song of the chaffinch. Time and patience are necessary to become familiar with bird calls and each spring we all need to recap on warbler songs as birds such as blackcaps, willow warblers and reed warblers arrive to set up their territories. The North Kent Marshes trip, led by Ken Palmer, always attracts a large turnout. There is a great view over the marshes, with large flocks of shelduck, mallard, teal, and wigeon while restless lapwings flutter and roll in the afternoon sun. Along the tide line, golden plover, sanderling and other waders move, busy feeding and then, in a flash, great flocks of waders and ducks take to the sky as a peregrine appears to hunt for his dinner. As evening approaches, the call of the little owl can be heard, mixed with the sound of farm tractors busy preparing the fields for the spring crops. On the visit to East Tilbury, Malcolm Riddler and his group braved a brisk offshore breeze to view avocets and black-tailed godwits feeding in the shallow Thames Estuary. As they make their way back along the path, a skylark rises on the wing singing, and all eyes try hard to follow its joyful flight. A chirpy robin calls from a hawthorn while a wren moves in the undergrowth, gathering moss for its nest. Derek Coleman and Nick Gardner lead a small group over the Beddington Sewage Farm. Sandpipers are a must on this site, as they lurk in the soft muddy beds and a silent approach gives good views. There are common sandpipers, wood sandpipers and green sandpipers here. Flocks of tree sparrows move along the small scrub bushes while Derek points out any passing raptors. Peter White shows members that even busy Wandsworth Common has pied wagtails and sparrowhawks. At Crossness in September, George Kalli can help with gull identification and departing migrants. Anyone daunted by the problems of gull identification could try a trip to the Lee Valley where the birds swim on the reservoirs.

All the LNHS bird trips have one target bird that most members would love to see and everyone keeps a sharp eye out for it. We have also great leaders who are willing to show us their local patch and we would encourage everyone to join them. The sites visited (in order of the first visit) were: Brent Reservoir; Dagenham Chase (two visits); Colne Valley and Broadwater Lake; Beddington SF (five visits); Hyde Park and Kensington Gardens; Trent Park (four visits); Waterworks NR and River Lea (two visits); Thames at Greenwich Peninsula; Morden Hall Park; Isle of Sheppey and Medway; Wandsworth Common (three visits); Muckings Creek, East Tilbury (two visits); Fisher's Green (two visits); Wanstead Park; South Norwood CP; Northaw Woods; Totteridge and Darlands Lake; Wimbledon Common; Berwick Ponds and Hornchurch CP; Tower Hamlets Cemetery; Cheshunt and Cornmill Meads; Regent's Park (two visits); Charlton area; Purfleet to Rainham Marsh; River Thames at Crossness; Bedfont Lakes CP; Two-Tree Island; Sewardstone Gun Powder Park; North Kent Marshes; Rye Meads RSPB; Foots Cray Meadows; and Lonsdale Road NR.

The indoor meetings have suffered slightly from the new venue at King's Cross but those members who do attend them know that the church is only a few yards from the station and that the area is well populated at that time of night. At the indoor meetings, there were talks on waders by Chris Ward, birds of Surrey by Derek Belsey, and on Thailand by Ian Hunter. At our AGM in

November, our chairman, David Darrell-Lambert, gave a talk on identifying gulls, which was very well attended. **We learnt from the LNHS study day in 2004 at the Wetlands Centre that members would like more talks on the identification of birds and we are going to introduce a series starting in September 2005 and we will change the day to Wednesdays, as members seem to prefer this to Mondays.**

In what is now an annual fixture, the LNHS had a stall at the Lee Valley Bird Fair, to try to attract new members. In February 2004, Catherine Schmitt, Sarah Barnes, David Darrell-Lambert, Robin Blades, Mike Trier and Angela Linnell manned the stall where they sold many LNHS publications and organized a prize for identifying photographs of birds. An obliging little owl was to be seen next to the marquee.

The Ornithology Committee would like to thank all those who helped organize the section and all members who participate but we welcome suggestions for improvements. Do contact the Committee with ideas for meetings and talks — let us know what you want us to do.

DAVID DARRELL-LAMBERT, *Chairman,* NICOLA DUCKWORTH, *Secretary*

Jewels in the Crown — wildlife in London's central Royal Parks

JAN HEWLETT

30 Arlington Gardens, Chiswick, London W4 4EY

Presidential Address delivered at the Annual General Meeting on 7 December 2004

Abstract

This paper begins by exploring the history of each of the five central Royal Parks, drawing from literature, maps and old pictures, attempting to show how events and people over the past 500 years have shaped the landscape which we see today. It then assesses the role of the parks as wildlife habitat, looking at ways people interact with nature and measures being undertaken by the management to encourage wildlife. It ends with a plea for more wildlife recorders. Finally, there are notes by Tim Freed on butterflies and moths and by Roy Sanderson on birds.

As I explained when I accepted the invitation to become your president two years ago, the wildlife of central London and its relationships with human society holds a particular fascination for me. Nowhere illustrates this better than the central Royal Parks. Londoners are rightly proud of their Royal Parks. New York has its Central Park, Paris its Tuilerie Gardens and Bois de Bouloigne, but few capital cities can beat our central parks: St James's Park, The Green Park, Hyde Park and Kensington Gardens, and Regent's Park. Whether you are simply out for a walk, hurtling along on rollerblades or attending a political rally, the parks have something to offer, but for any naturalist it is the birds, wild rabbits, squirrels and other wildlife that add a special sparkle: these are our 'jewels in the crown'.

So I would like to invite you to join me for an armchair stroll in the park. First, drawing from old maps, pictures and literature, we will explore the history of each of the parks — how they came to be the way they are. An appreciation of the history gives deeper meaning to the landscape. Then, changing spectacles, we will take an ecologist's perspective — what sorts of habitats do they offer for wildlife? Finally we will look at how some of the individual species are faring. I invited two colleagues from the central Royal Parks Wildlife Group to tell you about their special areas of interest. A note by Tim Freed on butterflies and moths and Roy Sanderson on birds therefore follows this talk.

Tudor London — the first Royal Park

The oldest of the five central Royal Parks is St James's Park, which dates from 1530, when Henry VIII acquired the land from the monks of Westminster. The king had recently built a palace at St James's (in addition to his other palaces at Whitehall, Greenwich and Hampton Court), and the park was to be developed for his personal pleasure.

Today St James's Park is at the very heart of London, but in the sixteenth century this site lay in the countryside, a few miles west of the city centre. In the Tudor gallery at the London Museum, a wonderful 'picture map' of London in the late 1500s is displayed (Braun and Hogenburg's map); it shows London still more or less confined within the old City walls (today's 'square mile'), and cut off by fields from separate settlements at Charing, Hoxton, and Marylebone. A map of Charing village a little later (1658) showing the early development of St James's Park is reproduced here as Figure 1. Note the

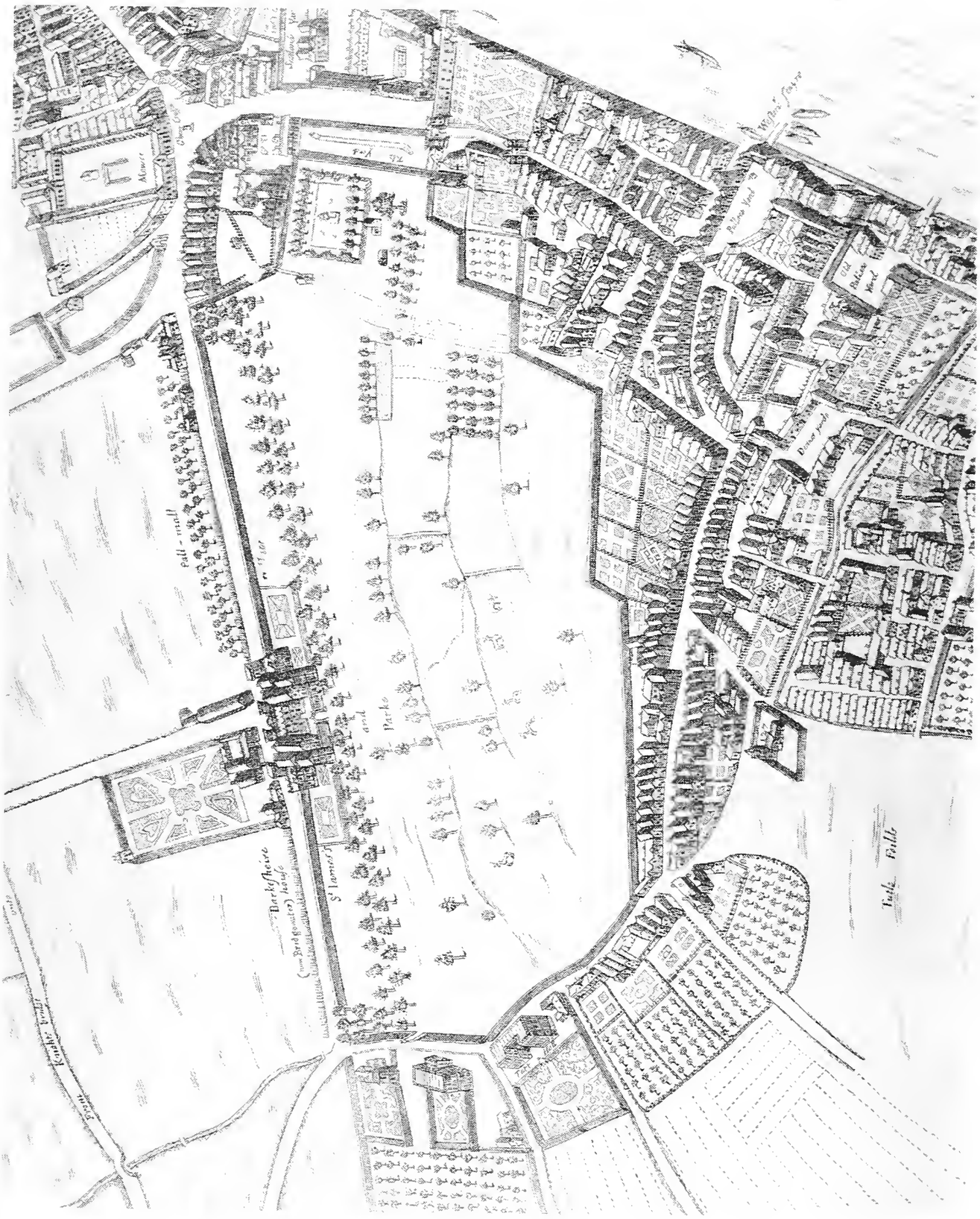


FIGURE 1. Map of Charing village, 1658. Courtesy The London Museum. © The London Museum.

walled park with deer, surrounded by orchards and fields, and the Tyburn stream coming down the hillside through what would become The Green Park.

The landscape moved a step nearer to the park we know today in Stuart London, when the monarchy was restored after Oliver Cromwell's Commonwealth. During Cromwell's reign, Charles II had been exiled to France, where he was much inspired by Versailles. He wanted to develop a similar park at St James's and developed the first lake as a long straight canal (Figure 2). Seeking to improve his popularity with his citizens, he opened the park to the public for the first time in 1660, his first year in power. He also began the custom of breeding waterfowl on this site, which has been a major influence in attracting wild birds to the park to the present day. The tradition of keeping exotic species at St James's had in fact already been established by his grandfather, James I, who kept a collection of exotic birds and other animals (hence the name of Birdcage Walk). In the illustration you may notice cattle grazing in the park. They were part of the park's economy. A picture which appears to be from the early 1800s shows a milkmaid serving mugs of fresh milk, straight from the udder.

By the early nineteenth century, a naturalistic style of landscaping was becoming fashionable and in 1827 George IV called in John Nash to redesign the lake, creating the now familiar landscape of gentle curves. Nash was also much involved in the controversial development of the former Buckingham House into Buckingham Palace, and from that time onwards the development of the palace and the park became inextricably linked.

St James's Park today

Undoubtedly it is the lake which, more than anything else, gives the park its character today. The juxtaposition of an inspiring landscape, the backdrop of magnificent historic buildings along Whitehall, the palace to the west, the ceremonial bands marching by from time to time, and the endless activity of the wildfowl on the lake, can sometimes give an impression of a stage set rather than a park. Yet there is plenty of wild nature too.

Some (mainly elderly) people come every day to feed the birds. An unusual degree of trust seem to exist between the birds and people; woodpigeons, which in the countryside can be quite shy, here sit on people's knees. Wild birds such as coot and moorhen join the throng gathering for scraps. Even birds which have recently arrived on migration from the wildernesses of Russia or Siberia soon seem to pick up the message.

The two islands are an important element in the way the park works, offering a sheltered refuge away from human disturbance. Woodland birds, such as the blackcap, as well as wildfowl, such as pochard and tufted duck, find secluded nesting habitat here, although the collection birds are now reared mainly at Regent's Park. A small population of pipistrelle bats is thought to roost on the islands. One of my most memorable experiences is being in the park just before 10 p.m. one summer evening, the fountains floodlit against the view to Buckingham Palace, and just as Big Ben began to chime, my bat detector began to pick up signals and pipistrelles appeared, flitting across the water from Duck Island.

One of the difficulties in managing a lake with a large duck collection is maintaining a healthy aquatic flora. However, over the past few years, the Royal Parks have developed stands of common reed and other marginal vegetation, protected by fencing while it becomes established. Reed warblers have been heard regularly in the last two summers and the number of dragonflies has increased, including large numbers of migrant hawker *Aeshna mixta* last summer. Grazing pressure can encourage diversity in pasture, and around the lake shore, where the geese have not reduced everything to bare earth, a surprising diversity of wild flowers can be found, including brooklime,

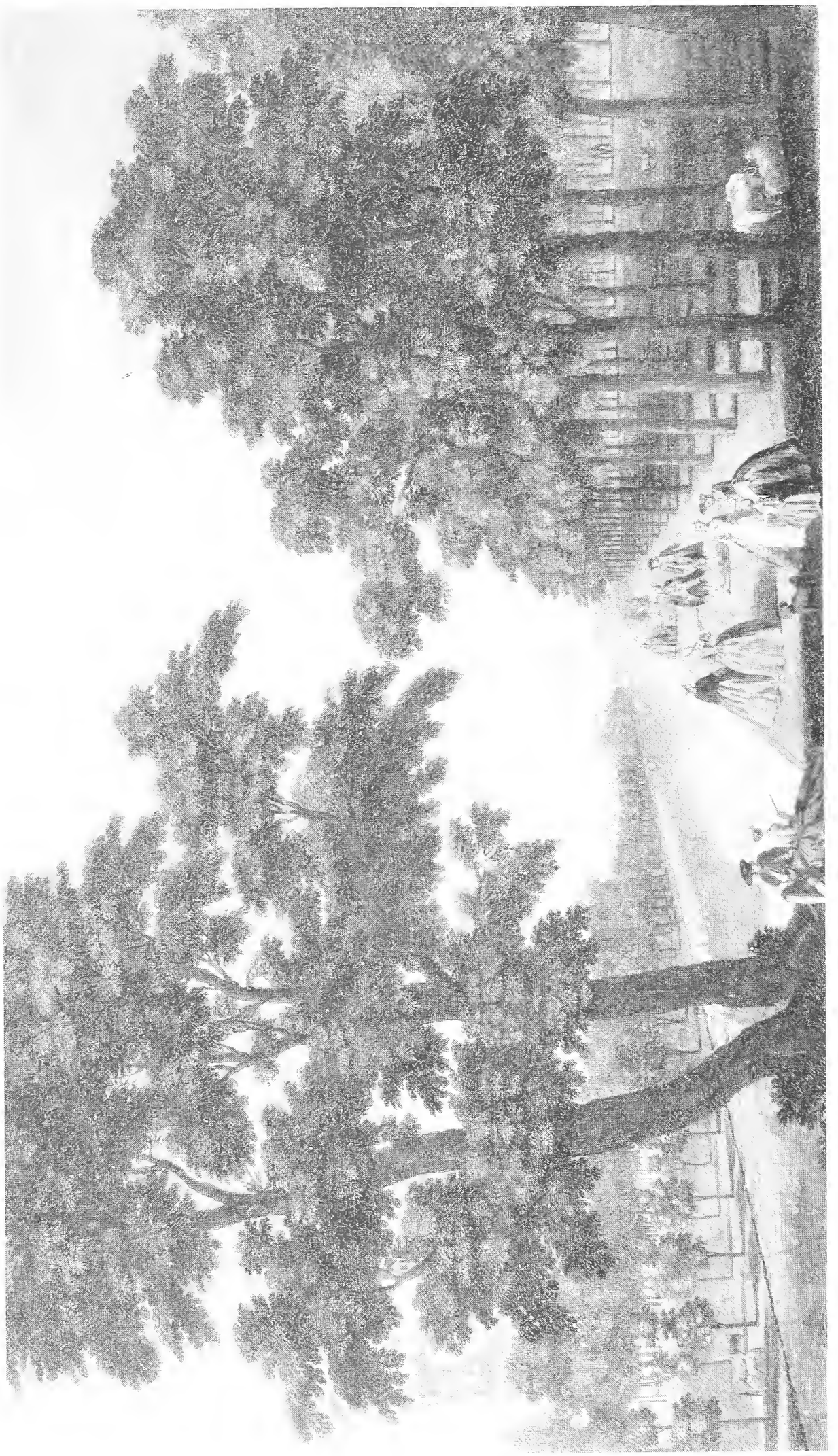


FIGURE 2. View of the canal, St James's Park, 1746. Courtesy The London Museum. © The London Museum.

ground ivy, common bird's-foot trefoil, oxeye daisy, small nettle and common parsley piert. Most of these appear to be growing naturally, but it is possible some have been introduced.

The park contains a fine collection of trees. Although London plane predominates, there is a huge variety including many fine old specimens, for example mulberries, fig, swamp cypress, and many flowering cherries. The extensive shrubberies are mostly enclosed by railings, offering an additional refuge for the birds.

From rough countryside to tourists' 'chill out' — The Green Park

Until well into the seventeenth century, this site appears to have been just a patch of rough countryside, a mixture of scrub and pasture, where cattle grazed and small boys went bird nesting among the bushes, and the 'lost' river Tyburn flowed down the hillside towards the Thames. It was probably a lot more interesting for wildlife in those days!

The land was first laid out as a park by Charles II, and was originally known as Upper St James's Park. Tree planting was concentrated towards the north-west of the park, near the valley of the Tyburn stream, which remains the most shaded area to this day. The king was said to have taken a walk up the hill daily with his spaniels — a custom remembered in the name Constitution Hill. A painting from 1765, looking towards the south from the north-east corner by Piccadilly, shows a bare landscape of open grassland, with a small reservoir, on which a few swans are gathered, towards the top of the hill.

The park has not always been the oasis of calm we know today. In the early 1700s it was a favoured spot for duelling. It also hosted various grand and probably noisy military displays and firework celebrations. In the early nineteenth century a proposal was put forward to build a royal palace here. Fortunately Buckingham Palace was chosen instead, so The Green Park survives as an important link in the chain between St James's Park and Hyde Park.

The Green Park today is not an ecologist's paradise. Its importance lies in its wider context, a place of respite for tourists trudging their way around the sights of London and a backdrop for royal events such as the Queen's Golden Jubilee celebrations. Views through to Buckingham Palace are therefore important, and perhaps for this reason the park lacks extensive understorey vegetation which would improve its value for birds. The mistle thrush, which likes an open landscape with mature trees, could often be found here in the past, although in several visits in late summer 2004 I did not find a single bird. From a number of other surveys (Sibley et al., in prep.) it appears the species has declined in central London. The most interesting area from the naturalist's perspective is the valley of the lost Tyburn stream and two small hillocks towards the north-west. Here the park has a well-established understorey of whitebeam, native hawthorns and American cock's-spur thorn *Crataegus crus-galli* which offer berries for birds. The management has recently begun to relax the mowing regime in this part of the park, which creates a more rural feeling, with swathes of yarrow, white clover, dove's-foot crane's-bill and cow parsley amongst the longer grasses. A small patch near Hyde Park Corner is surprisingly diverse, with common knapweed, meadow vetchling, common bird's-foot trefoil, meadow and bulbous buttercups and creeping cinquefoil.

Hyde Park — origins

Once he had St James's Park under control, Henry VIII set his sights on 'The Manor of Hyde' a little to the north. He acquired this site in 1536, also from the monks of Westminster, though this time he gave them some land in Buckinghamshire in exchange. The extent to which the land was wild forest, in

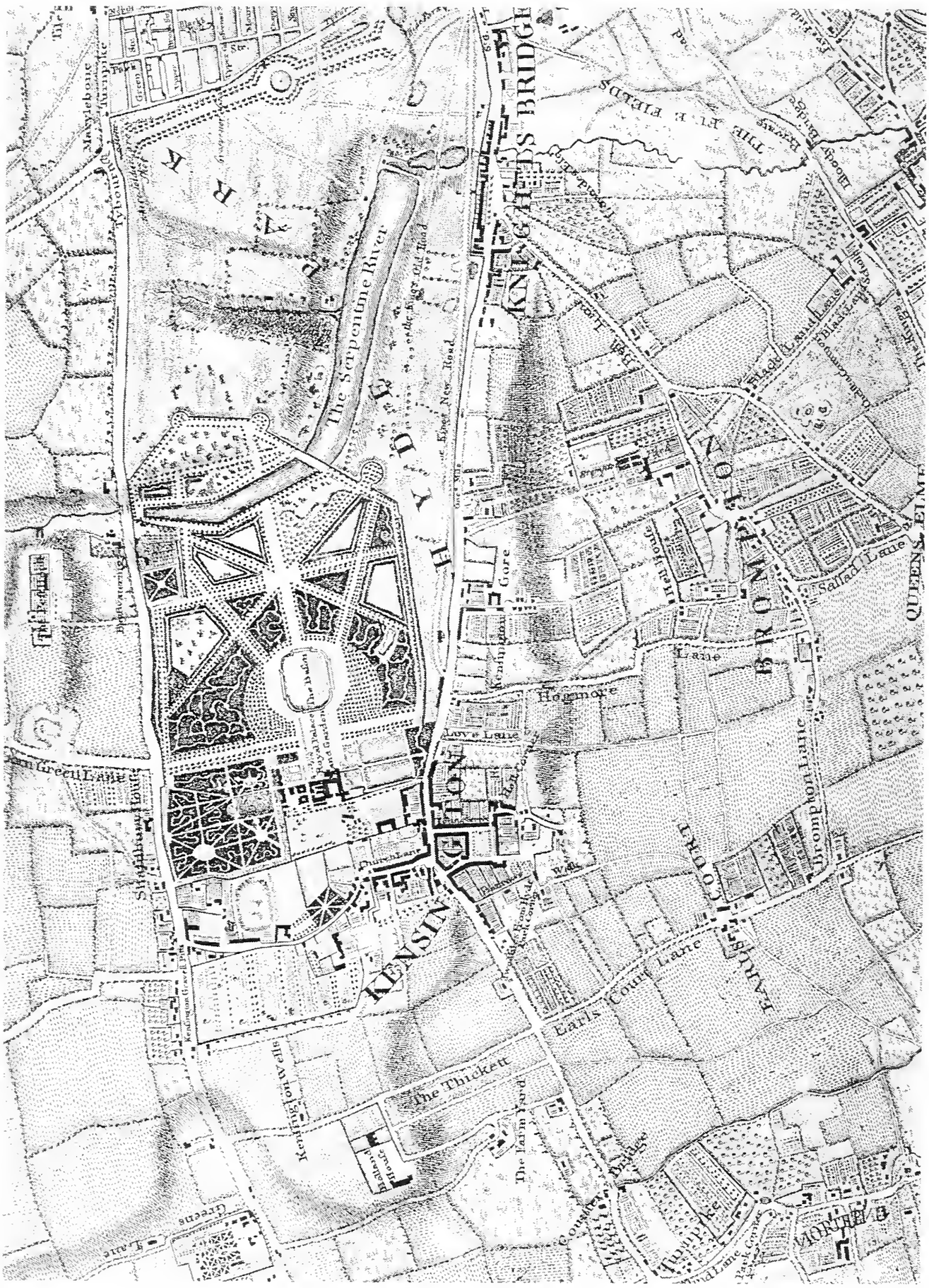


FIGURE 3. Detail of John Rocque Survey. Courtesy The London Museum. © The London Museum.

the sense of woodland, rather than a looser definition 'furze waste', at that time is uncertain. Much of area had apparently been farmed by the monks for crops and pasture, and a chain of pools had been developed along the Westbourne, which were probably used as fish ponds. That there must have been some woodland or scrub is evidenced by the fact that the keeper had pannage rights for his pigs. Henry VIII used the park for hunting, taking deer, wild boar, hare, partridge and heron. Hunting was tightly controlled and the park was enclosed by palings to keep the public at bay. Given the rural surroundings, my guess is that local people would have felt more aggrieved at not being allowed to hunt for a good square meal, than access to countryside. At any rate, one could surmise that the temptation was strong as the punishment for poaching was severe — hanging at Tyburn corner (near Marble Arch today).

The park was first opened to the public by James I in 1637. He was apparently rather unpopular and saw it as a way to bolster his image. It soon became a fashionable place to go. The smart place to see and to be seen was an area called The Ring, where carriages perambulated in two concentric circles. It lay somewhere between the present-day park offices at Ranger's Lodge and the Lookout education centre.

In Figure 3, which is a reproduction of John Rocque's map from the mid 1700s, you will see Hyde Park and the then newly created Kensington Gardens surrounded by countryside. The farmland of 'Bayswatering' by the Westbourne lies to the north, with 'The Five Fields' which would become Belgravia to the south-east, and the small village of Kensington centred around Church Street to the west.

From paintings held in the London Museum, it is possible to draw some idea of the landscape and functions of the park in the seventeenth to nineteenth centuries. It is evident that by this time the uses were not restricted solely to elegant posturing. A picture from 1802 shows the 'Hyde Park Dipping Well' where a group of mothers are bathing their babies in a small pond, with deer looking on the background. For most Londoners, at that stage, indoor bathrooms were a luxury beyond their dreams.

By the mid nineteenth century London was growing fast, and the park had become a pleasure ground for the wider population rather than just for the well to do. A painting from 1858, which is reproduced as Figure 4, looking north from The Serpentine, shows a group of tourists, relaxing by the lakeside, against a slightly more open landscape than today. It is also rather more rural in quality, with natural earth banks to the lakeside, but the parkland is beginning to look distinctly worn in places. Several of the mature trees, perhaps oaks, look far from healthy, which is possibly a reflection of the city's polluted air. It was around this time that much of the present structure planting was begun, and the lines of common lime and London plane date from this period. These may have given a more formal quality to the landscape. The trees were selected as being among the few species which could thrive in the smoky air. Writing in the 1890s, W. H. Hudson (1898) felt the parks were becoming poorly managed for wild birds. The mistle thrush, greenfinch and spotted woodpecker had disappeared as nesting birds, wrens were reduced to a single pair nesting near the Albert Memorial, and the robin was thought to be on its way out. Whether the parks' management of the day should be blamed for this is no doubt something LNHS members could debate at length, but all five species are regularly seen in Hyde Park and Kensington Gardens today.

Hyde Park today

Without question, Hyde Park is a great place for people. As I was drafting this text in June 2005, over 200,000 people were singing and dancing at the 'Live Aid' concert — the largest event yet staged in the park in terms of numbers of people attending — which took place on The Parade Ground, the vast open field adjoining Park Lane.

FIGURE 4. A summer day in Hyde Park, 1858. Courtesy The London Museum. © The London Museum.

Just a little to the north and west of this area, lies Hyde Park Meadow, one of the most interesting parts of the park to any naturalist, which for the past fifteen years has been managed as summer meadow. Some of the wild flowers are naturally occurring, whereas others, including the now substantial clumps of black knapweed, oxeye daisy, and common bird's-foot trefoil were initially introduced. Most of the meadow lies over London Clay and the sward is fairly rank, but where the sands and gravels of the Taplow Terrace predominate, finer grasses become more frequent and there are patches of distinctive acid grassland flora. Here the tiny upright 'paintbrushes' of early hair-grass can be found together with sheep's sorrel, cat's ear and mouse-eared hawkweed. The meadow adds enormously to the park's interest, with a succession of different wild flowers — cowslips and bulbous buttercup flower before the grass gets too tall in late April to early May, with oxeye daisy and bird's-foot trefoil a few weeks later, followed by knapweed and wild carrot in June and July. Meadow brown and Essex skipper butterflies have now become established, and the mowing regime has been adjusted to encourage their overwintering stages. Dragonflies such as the emperor and black-tailed skimmer can be seen cruising over the grasses in summer, perhaps reflecting the recent improvements, including small patches of emergent vegetation, on The Serpentine.

A particularly attractive area lies to the south-west of the main meadow, in the valley of a lost stream, just to the north of the Old Police Station. A sheltered spot, it hosts a fine display of bulbous buttercups and hybrid bluebells in spring, with meadow buttercups following a little later. Edward Milner has identified this patch as particularly good for spiders, and it may be we are looking at a genuine fragment of old habitat.

Most of the rest of the park comprises a simple landscape of grass and trees. London plane, common lime and horse chestnut make up the majority of the structure planting. Dependence on so few species is of some concern as it leaves the park vulnerable to outbreak of disease. Oaks are more common towards the north-west of the park; they tend to grow better on the London Clay. Some of the more unusual specimen trees in the park are described by Elinor Wiltshire (1997) in *The London Naturalist* for 1996.

An excellent and detailed account of the wild herbaceous flora can be found in a series of papers by Wiltshire (1994, 1996 and 1999). The author traces the history of individual species, distinguishing between 'old timers' like meadow buttercup, scented mayweed, goat's beard and lady's bedstraw, which have been part of the park's flora for more than a hundred years, and newcomers such as Guernsey fleabane, hoary mustard and Californian brome which have arrived in the past twenty years.

For small song birds, the park's mature trees and extensive shrubberies are its most important feature. Most of the shrubberies are fenced off from the public by railings, offering seclusion for the birds. The Hudson Memorial Sanctuary forms a ring of semi-natural woodland surrounding the Nursery. It is here you are most likely to hear a blackcap or chiffchaff. But there are other substantial shrubberies, including two thickets near Hyde Park Corner, the Dell and several alongside The Serpentine.

Kensington Gardens — origins

During the early 1700s, the Royal Family was based at Kensington Palace, rather than St James's Palace, and it was Queen Caroline, the wife of George II, who developed the gardens we know and love today. She ordered the laying out of the landscape with its formal avenues, separated by informal areas known as 'The Quarters', the basic structure of which has been preserved to the present time. On John Rocque's map, this striking design contrasts sharply with the informal landscape of Hyde Park next door. She also developed the 'Serpentine Lake' from the pools along the Westbourne. Some of the individual trees from her original planting, notably sweet chestnuts and horse chestnuts,

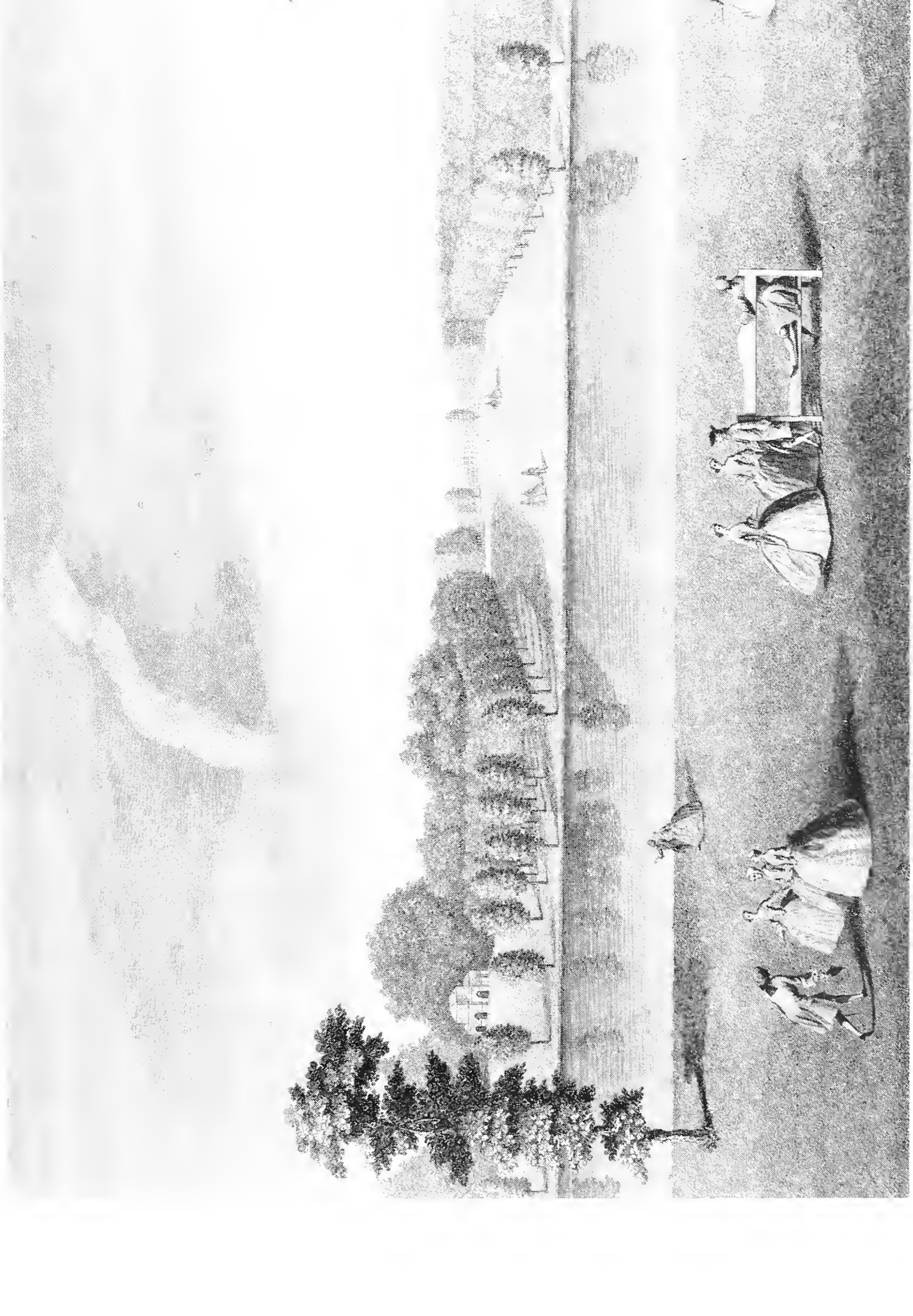


FIGURE 5. Kensington Gardens (mid-1700s). Courtesy The London Museum. ©The London Museum

survive to this day. Now old and gnarled, they provide good habitat for woodpeckers, nuthatch and treecreeper. As part of her ambitious plan for the gardens, Queen Caroline helped herself to part of Hyde Park, despite its being open to the public by that time. Apparently she had designs on the whole of Hyde Park, but was dissuaded by her prime minister, Sir Robert Walpole, who — when asked what it would cost — replied sagely 'Your crown, your majesty'.

A painting from the mid 1700s, which is reproduced as Figure 5, looking across The Long Water from the east, shows a landscape punctuated by sharp lines of young trees, framing the view towards the palace. This view can be recognized today with little change, apart from the ageing or replacement of some of the trees and the addition of The Long Water Sanctuary woodland. The park was not opened to the general public till the 1790s, at first only on Sundays, and even then you had to be suitably dressed. Full opening had to wait till Victoria's day. The park has somehow retained an air of gentility to the present time.

By the early twentieth century it had acquired a particular association with children — hence the connection with J. M. Barrie's Peter Pan. An interesting collection of picture postcards assembled by a North Kensington community group (Adams 2003) shows images of sheep grazing in the park, nannies in starched uniforms pushing large prams, and children fishing in the Round Pond. According to one of the contributors he and his schoolfriends used to sneak off school and earn a few pennies selling tiddlers to the tourists.

In several of the pictures I studied, lines of elm trees feature prominently. Queen Caroline planted more than 2,500 elms. Many of these succumbed to the smoke-filled air in the late 1800s, and others were lost to Dutch elm disease (of which there were apparently several outbreaks in addition to the devastating outbreaks in the 1950s and 1970s). But trees were also felled for other, less obvious reasons. In a heart-rending chapter entitled 'Expulsion of the Rooks', W. H. Hudson (1898) laments the felling a grove of 700 elms, which supported the park's last colony of rooks. A smaller group of elms in the south-west corner of the park was the last stronghold for a small colony of jackdaws, which hung on till the 1960s. Now rook, jackdaw and elm have gone from the park. One of the overall effects of the loss of the elms is a reduction in the proportion of native species in the tree canopy of the park. It would be good to see this restored.

Kensington Gardens today

The dominance of the historic planting, with its strong tree lines emphasizing views to historic features, could lead to a perception that the park is not good for wildlife. Whilst the landscape is far from natural in the visual sense, the combination of large numbers of mature trees with secluded shrubberies means this is an excellent park for birds. Twenty-one species bred in 2004, with six other species regularly seen and recorded as 'possibly breeding'. The mature trees in the Quarters support uncommon species for central London, such as great spotted and green woodpeckers, treecreeper and coal tit. The Long Water Sanctuary, an area of predominantly native, planted woodland along the east bank of the lake — the inspiration of Max Nicholson and others on 'The Committee for Bird Sanctuaries' in the 1930s — attracts species such as blackcap and chiffchaff as well as the more common tits, robin and wren. Roy Sanderson's records show that even the woodland garden around the South Flower Walk supports a high density of breeding birds; despite its more formal character the vegetation none the less mimics a woodland structure. As in Hyde Park, many of the small birds are hand-tame and clearly give delight to visitors. The veteran trees are also important for fungi and invertebrates. Dan Hackett has recorded rare beetle species associated with old wood pasture in the park's ancient oaks.

Where formality is less of a priority, much of the grass is now left uncut throughout the summer, or cut just once a year. Some nice areas of old grassland survive, particularly to the east of the Round Pond where the land slopes down towards The Long Water. The soils here are mainly light and well-drained, lying over the Taplow Terrace, and the sward is dominated by bent grasses, but also includes species such as crested dog's-tail and sweet vernal-grass, which are associated with old pasture. Meadow and bulbous buttercup are common, together with cut-leaved crane's-bill and lesser stitchwort. In the driest areas, patches of acid grassland with sheep's sorrel and early hair-grass can be found. A small clump of hairbell was found a few years ago in the grassland east of The Long Water Sanctuary on Buck Hill. It appears to have been growing naturally, probably regenerating from the seed bank in a particularly warm summer when the grass was under drought stress. Where the London Clay is nearer the surface, large clumps of hairy sedge *Carex hirta* occur, and I have also recorded *Carex ovalis* and toad rush.

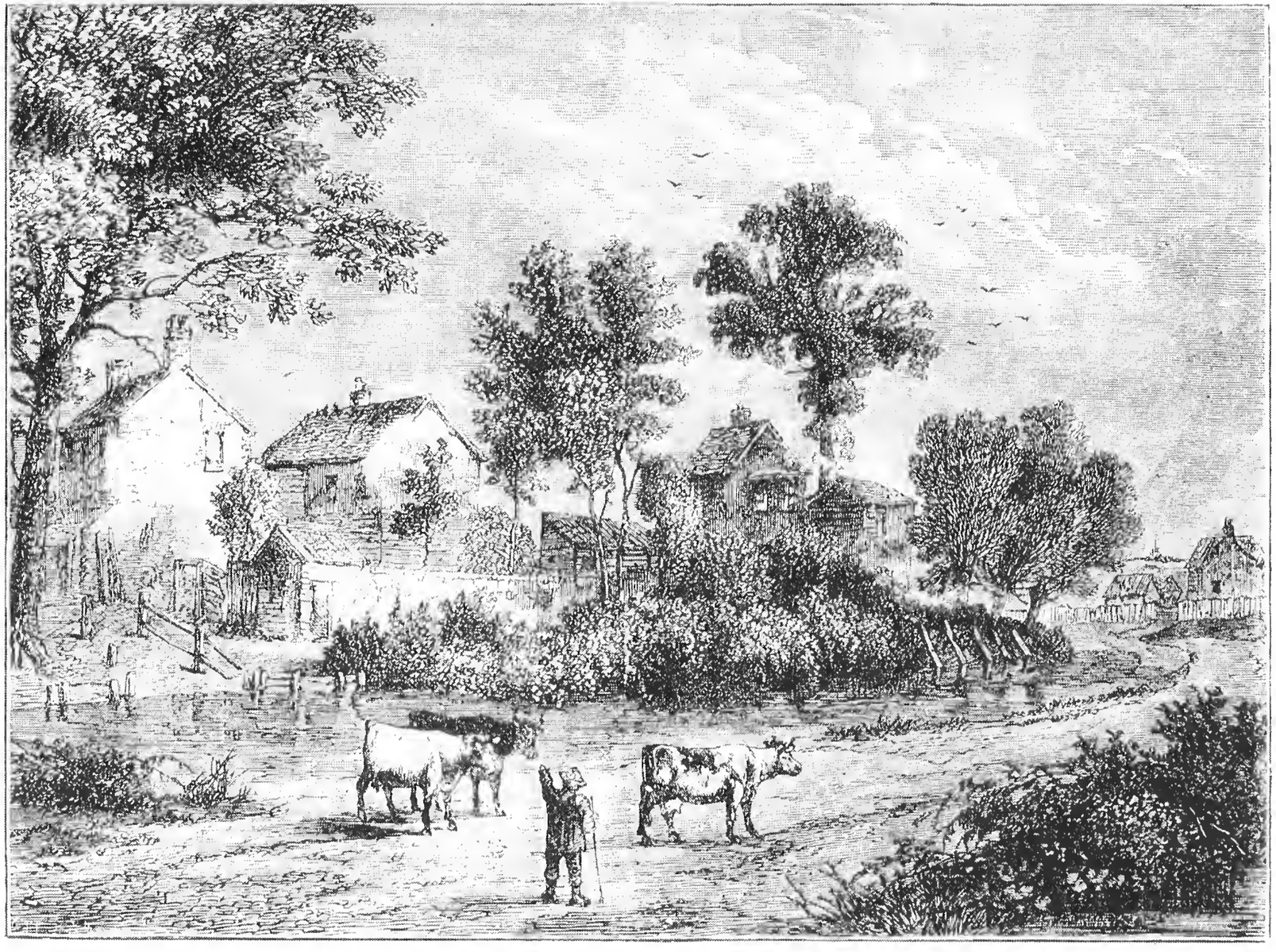
The Long Water and The Serpentine together offer a substantial stretch of aquatic habitat. Whilst The Serpentine is managed primarily for active recreation, The Long Water is more secluded, with much of its banks shaded by shrubbery, and public access to the waterside confined to a few places. Great crested grebe breed regularly, as do tufted duck and pochard, and little grebe were present in 2004.

By contrast, on aerial photographs, the Round Pond stands out as a huge sheet of water set in wide open surroundings, offering clear flight paths for wildfowl. A few years ago it was notable in a central London context for small flocks of shoveler and it was also important brood rearing habitat for mallard and tufted duck. More recently it has become adopted by a non-breeding flock of mute swan. A peak count of eighty-nine birds is recorded in the *London Bird Report* for 2000. It is good to see these birds thriving after their decline linked to lead angling weights, but such large numbers present problems for management and a diet composed primarily of bread offered by the public falls short of ideal.

From Marylebone Farm to Regent's Park

The last of the five central Royal Parks to be developed was Regent's Park. A fascinating little book by A. D. Webster (1911), the park's superintendent from the late 1800s to early 1900s, reveals its history. The area had remained farmland, known as Marylebone Park, up to the 1800s (Figure 6). Prior to that, it probably retained a greater amount of woodland, since in the Domesday Book, the 'Manor of Tyburn' is recorded as offering pannage for fifty pigs. It is recorded that in the 1600s Oliver Cromwell ordered the felling of almost 3,000 oaks from this area for his navy. 'The environment' was clearly not a priority in his government's agenda! Up the hill to the north, Primrose Hill was famous for its primrose-laden hedgebanks.

As its name implies, the present park dates from the Regency period (1820–30s). It was part of John Nash's 'grand design' for the West End, a vision which embraced an area stretching from St James's Park in the south, through Regent Street and Portland Place to what would become The Regent's Park. The concept for the park was originally an up-market residential area set in parkland, where desirable people would be attracted to live, who in turn would have a good influence on the capital. Nash's original plan (reproduced in Hibbert 1969) shows a ring of houses in the Inner Circle and terraces along what is now part of the Broad Walk and London Zoo. Fortunately, before Nash's development was completed, Parliament stepped in and decided that the remaining open land should become a public park. Thus Regent's Park was opened to the public in 1838. However, its history helps to explain why there are several private dwellings set within the overall curtilage of the park. The lake retains essentially John Nash's design, which was based upon an expansion of the Tyburn and one of its tributaries. London Zoo was developed around the same time, so the park and the zoo share a closely linked history.



FARM IN MARYLEBONE PARK, 1750

[To face p. 14

FIGURE 6. Farm in old Marylebone Park, 1750.

Reflecting its much shorter history as a Royal Park, Regent's Park lacks the veteran trees of Kensington Gardens. Webster gives us a personal insight into the difficulties in establishing trees in the smoke-filled air of late-Victorian London, with additional constraints reflecting the park's foundation on heavy London Clay soil. Native oaks were apparently particularly difficult to establish, although Turkey oak fared better, as well as of course the now ubiquitous London plane.

Regent's Park today

Regent's Park is a park of great variety and contrasts, ranging from exquisite rose gardens in Queen Mary's Gardens, through large areas of traditional parkland with scattered trees, to extensive sports pitches (representing the largest open-air sports facility in central London) and more natural areas of rough meadow and woodland, especially along the interface with the Regent's Canal. This diversity is reflected in the fauna. Regent's Park has the longest butterfly list of the five parks, with twenty-one species compared with seventeen in Hyde Park and Kensington Gardens and ten in St James's Park (T. Freed pers. comm.), and longest spider list, with 106 species, compared with fifty in Hyde Park and forty-one in Kensington Gardens (J. E. D. Milner pers. comm.).

Webster traces the decline of wild flowers from the days of Marylebone Park and the Tyburn, when early purple orchid and marsh marigold grew along the river bank, to a more restricted flora of the late nineteenth century urban park. Many of the thirty-six or so surviving species which he recorded, for example deadly nightshade, bittersweet, colt's-foot and foxglove, can still be found in the park today, but in recent years the Royal Parks Agency have also embarked on a number of initiatives to restore a greater variety of wild flowers. This is being achieved partly through allowing the grass to grow up through the summer where close mowing is not required, allowing swathes of cow parsley, buttercups etc. to thrive, and partly through deliberate sowing or planting of native species. There is a colourful 'created meadow' bank along the northern edge of the park near London Zoo, and an interesting patch of 'wilderness' towards the eastern boundary, where introduced cornflower intermingles with goat's rue, common melilot, poppy, wild carrot, mugwort and stands of creeping thistle. As part of the current major upgrade to the sports facilities, new areas of wild flower meadow are being created around the margins of the pitches.

The lake is a central focus. One of its most conspicuous features is the heronry, with twenty-seven pairs in 2004. The heronry dates from 1967 — its proximity to fish supplies in several of London Zoo's enclosures surely no coincidence? In 2004 one pair built its nest right inside the Zoo just a few metres from the pelican pool. The lake shore has recently been enhanced by planting of reed beds. Reed warblers were quick to take advantage and now breed regularly in the park. A further area of wetland vegetation with shallow pools has recently been developed in a former goose paddock. Partly as a result of this, the park's dragonfly list has increased from four to ten species (T. Duckett pers. comm.).

Wildfowl rearing for both St James's and Regent's Parks takes place in a 'duckery' near the western arm of the lake, and nesting boxes are scattered along the more secluded stretches of the lake shore. Tony Duckett, the collection's manager, aims to keep a representative collection of British species as well as a range of exotic birds, clipping the wings of those which do not occur naturally in the London area. Occasionally a pair nests somewhere well hidden and the young are not found before they fly. This may account for the pintail which turned up recently at the Barnes Wetland Centre.

Wild mammals in the central Royal Parks

Fox, rat, house mouse and large numbers of grey squirrel occur in all five parks. Fitter (1945) thought any fox reported in central London was likely to be an escaped pet, but although our urban foxes show little fear of man there is no doubt that they are truly wild. The hedgehog is thought to survive only in Regent's Park, having disappeared from Hyde Park and Kensington Gardens within the past ten years, for reasons unclear. Wild rabbits hold on in The Long Water Sanctuary in Kensington Gardens. Ten years ago they could be found also in Hyde Park and Regent's Park, but numbers have declined sharply, partly through myxomatosis. I saw a wild rabbit early one morning in Park Crescent, near Regent's Park in 2000, but have not heard of any more recent records. Woodmice are believed to occur in all five parks, but field voles seem not to extend into central London.

The London Bat Group has records of five species of bats in the parks in recent years. The commonest as might be expected are pipistrelle, including both the common and soprano species (*Pipistrellus pipistrellus* and *P. pygmaeus*, picked up at 45 kHz and 55 kHz respectively). In September 2004, John Tovey of London Bat Group found three noctules at Regent's Park and also heard a serotine. A Daubenton's bat was also reported there last summer. Noctules have also been sighted within the past few years in Hyde Park.

In a paper in British Wildlife, 2002, which compares data from a London-wide bat survey in 1999 with a larger scale survey in 1985, the late Pete Guest expressed concern that London's bats, particularly noctules and serotines, were declining, although pipistrelles appeared to show a small increase. From my own records in St James's Park and Kensington Gardens and data kindly provided by Linda Beard of London Bat Group, it would seem pipistrelles are holding up reasonably well in the five parks, compared with the 1985–6 survey (Mickleburgh 1987), but noctule numbers are very low. Much of the recent habitat enhancement work by the Royal Parks Agency, such as planting of reed beds and native trees, should be beneficial for bats, but concerns include the introduction of floodlighting, and the need to protect tree roosts.

Birds

It is impossible to do justice to the parks' rich and varied bird life in a broad-brush review such as this and a few headlines and highlights only will be included here. About fifty species nested in or nearby the five parks in 2004, with many more species recorded as visitors or on passage. The largest number of species recorded was in Regent's Park, thanks partly to meticulous record keeping by Tony Duckett.

Great crested grebes nested in Hyde Park, Kensington Gardens and Regent's Park, although in the last case the young failed to fledge owing to predation by red-eared terrapins. A single pair of little grebe nested successfully in Regent's Park and a pair bred again at St James's Park, a welcome return after a gap for some years. Two pairs of sparrowhawk nested in Regent's Park, and the kestrel returned as a breeding species after being absent as a breeding species for eight years. A pair of peregrine nested successfully fledging two young on the University of Westminster tower near Baker Street Station, thanks to a great deal of care by Dave Johnstone and Tony Duckett; it was the species' first successful nesting in central London and provided an exciting spectacle for visitors to the park in the days just before the young fledged. The tawny owl was confirmed as nesting only in Regent's Park, although the species was heard and may have bred in or near St James's Park. Ring-necked parakeets have become increasingly common; I have seen up to ten in Kensington Gardens and it can be only a matter of time before they nest. The song thrush and mistle thrush nested in Hyde Park, Kensington Gardens and Regent's Park, and both species were also recorded in St James's Park but numbers are low compared with earlier years.

Conclusions

I hope I have been able to show you the parks from a fresh perspective rather than a purely natural history point of view. I have touched only lightly on individual groups of plants and animals, but sufficient I hope to demonstrate the breadth of natural history interest contained within their acres. We are lucky to have such fine places to visit, but need to recognize that they are always under enormous pressure, reflecting their role in the city's cultural life, as well as for tourism and recreation. Given the numbers of people in the parks on a summer afternoon, it sometimes seems amazing that we see as much wildlife as we do. But it requires commitment from the parks management to ensure that the needs of nature are taken into account alongside all the other pressures. This in turn depends upon having good natural history records, so the people involved know which are the more sensitive areas, or the most vulnerable species. If you would like to help with bird recording, Roy Sanderson will be pleased to hear from you, or if you would like to help with other natural history recording, contact Dr Nigel Reeve, the Royal Parks community ecologist, at Holly Lodge, Richmond Park, Richmond, Surrey TW10 5HS.

Acknowledgements

I am most grateful to Mike Fitt and Nigel Reeve from the Royal Parks Agency for their help in compiling this presentation and to the Museum of London and the City of Westminster local history library for access to archive material. Thanks are also due to Tony Duckett, Edward Milner, Tim Freed and Linda Beard for providing records on birds, dragonflies, spiders, butterflies and bats respectively.

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Erratum. In last year's Presidential Address (*LN* **83**) some errors appeared in the last sentence on p.17. It should read 'Many of the protestors were in fact city dwellers, so it is perhaps not surprising that concern for the countryside should be followed by an increased awareness of wildlife within towns, inspired by books such as Bunny Teagle's *The Endless Village* (1978).' Ed.

Butterflies and moths in the central Royal Parks — some recent observations

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I was most grateful to Jan for inviting me to give a brief presentation on the Lepidoptera recently recorded in the central Royal Parks. Most of these have been noted by myself during day and night-time surveys in Hyde Park and Kensington Gardens, Regent's Park, and occasionally in St James's Park and The Green Park (Freed 1993, 1998*a*, 1998*b*, 2001; Freed and Newland 2004). Various other sightings have also been collated from park managers and their staff, the Hertfordshire and Middlesex annual butterfly and moth reports, published by Butterfly Conservation, and other literature.

The general status of butterflies and moths in these parks today is one of fairly broad diversity, which includes several locally rare species, at least five Nationally Notable moths, and six new moth records for Middlesex. However, actual numbers of butterflies seen, with the exception of Regent's Park, are invariably low, with several species being recorded as singletons, occasional visitors, or in very low density. The following table lists the twenty-three kinds of butterfly noted since1990. No other details are shown here (e.g. dates, numbers, status etc.), but they will be included in a forthcoming paper in *The London Naturalist*. Seventeen species of butterflies and about 150 of moths have been recorded in Hyde Park and Kensington Gardens. Casual sightings of butterflies in St James's and The Green Park have produced about eleven species in the same period. The results from Regent's Park exceed all these with twenty-three species of butterflies and about 250 of moths. Bearing in mind the limited number of survey visits made to each park, these totals compare favourably with those from Buckingham Palace Garden where twenty-three butterfly and 617 moth species were recorded during regular surveys between 1960 and 2001 (Carter 2001).

I prepared eight composite slides to illustrate my talk. The first showed the ubiquitous holly blue butterfly which is well established wherever its main parkland hostplants, holly and ivy, grow in proximity. Although a wide variety of early flowering shrubs and trees can be utilized by ovipositing first-generation females (e.g. dogwood, snowberry and cotoneaster), holly is the most important in the central Royal Parks for this attractive butterfly. Mature ivy, the second-generation host plant, is mainly restricted to enclosed woody areas such as the Nursery in Hyde Park, The Long Water in Kensington Gardens, the Leafyard in Regent's Park, and in various private gardens where it is sometimes allowed to cover walls or scramble up the occasional tree.

The second slide showed the Hyde Park Meadow, referred to earlier by Jan. In spite of considerable efforts to introduce wildflowers here, and thus provide more nectar and hostplants, this site was, until recently, very poor for butterflies. One of the main reasons for this was the method used to remove the sward: cut grass and wildflower seeds were suctioned off together with any ova and larvae, which might be attached to them. In the mid 1990s changes were made to the cutting and collection methods, and this, together with the recent decision to leave certain sections uncut through the winter, has led to a gradual increase in numbers of butterflies. These include small and Essex skippers (which require tall grasses in July and August for ovipositing), small white, common blue, meadow brown, and speckled wood in the shadier parts. A healthy population of various grass-feeding crambid moths (Pyralidae) has established along with other invertebrates of open neutral and acidic grassland. Dr Nigel Reeve's recently devised management scheme to create a mosaic of differing grassland structure here should produce further increase in Lepidoptera.

The third slide showed Buck Hill in the western part of Kensington Gardens. It was here that several unusual wildflowers appeared in the late1990s following the relaxation of grass-cutting. So far there have not been any records of skippers and browns breeding, but it is probably just a matter of time before this happens since the site incorporates their ecological requirements. In 1998 several freshly emerged small tortoiseshells were seen here attracted by the profusion of yarrow flowers. These butterflies probably originated from the several nests of larvae observed earlier that summer on nettles growing nearby in The Long Water enclosure.

My fourth slide showed The Arch — a grassland site within The Long Water enclosure in Kensington Gardens where a Henry Moore sculpture used to stand. Common bird's-foot-trefoil, oxeye daisy and common knapweed grow abundantly, and species like six-spot burnet moth, and small skipper and common blue butterflies are occasionally seen here. Several places along The Long Water margins have been planted with common reed, lesser bulrush, bulrush and others, providing valuable habitat for some specialist moths, as well as dragonflies and much other fauna. Surveys of these sites in 2005 found twin-spotted wainscot and *Chilo phragmitella*, two reed bed species which are rare in Middlesex.

We now move to Regent's Park, which appears to be the best of the 'jewels in the crown' for Lepidoptera. In 2003 a Butterfly Transect Walk was started here recording seventeen species between the Leafyard and Goose Pen. Four other species were noted outside transect walks including small copper, white-letter hairstreak (found in larval form on wych elm), and marbled white, recorded by Tony Duckett during a summer which saw its further westward expansion in London. The speckled wood is particularly abundant in Regent's Park, which is the only central Royal Park where the brimstone and orange-tip breed regularly, the larvae of both being found here on their respective host plants, buckthorn and garlic mustard.

The Leafyard, in the north-western part of the park, incorporates mature woodland, and open and shaded grassland with plenty of nettle beds. In 2003, twelve butterfly and 154 moth species were noted here, including the micromoth *Nemapogon ruricolella*, a new record for Middlesex. The Cricket Pen, Silt Pen and Goose Pen are more centrally located and form a valuable block of enclosed grassland habitat with abundant wildflowers and tall grasses. The large skipper is particularly abundant here and flies together with small and Essex skippers. Management in these sites is minimal, particularly so in the Cricket Pen, so called because of the discovery of a colony of Roesel's bush-cricket there in the mid 1970s. A wetland area dedicated to the late Ruth Day was created in the Silt Pen in 2003. This initiative should further enhance the entomological value of the area.

My seventh slide illustrated some interesting and elusive lycaenid butterflies of the central Royal Parks: purple and white-letter hairstreaks and small copper. The latter two are rare in inner London and breed in Regent's Park. The purple hairstreak probably occurs here too, but has not yet been seen in Hyde Park or Kensington Gardens. It is however, common in Brompton Cemetery (also owned and managed by the Royal Parks Agency), where I have observed it ovipositing on the abundant evergreen oaks, and occasional Turkey oaks (Freed 1998*b*).

The eighth slide showed moths: surveys have been carried out using light traps (placed in specific areas to protect them from vandalism at night). Such sites included the chapel roof in Brompton Cemetery, Ranger's Lodge garden and the Lookout in Hyde Park, and various enclosures in Regent's Park. Results have been rewarding with the unexpected turning up, such as tree-lichen beauty and Webb's wainscot in Regent's Park, the former being the first Middlesex record for this colonist which until recently, was found only along the south coast. Spectacular hawk-moths include poplar, lime and elephant,

and also a humming-bird hawk-moth (seen by Dave Johnson in Regent's Park in 2003). Several day-flying moths such as six-spot and narrow-bordered five-spot burnets, and burnet companion have also been noted, though sadly only in very small numbers.

The enlightened attitude recently shown towards ecologically sensitive management and planting bodes well for the future of Lepidoptera in the central Royal Parks.

Table showing butterflies recorded in the central Royal Parks since 1990.

Common name/Scientific name	Hyde Park	Kensington Gardens	Regent's Park	The Green & St James's Parks
Small skipper *Thymelicus sylvestris*	×	×	×	
Essex skipper *Thymelicus lineola*	×	×	×	
Large skipper *Ochlodes venata*			×	
Clouded yellow *Colias croceus*	×	×	×	
Brimstone *Gonepteryx rhamni*	×	×	×	×
Large white *Pieris brassicae*	×	×	×	×
Small white *Pieris rapae*	×	×	×	×
Green-veined white *Pieris napi*	×	×	×	×
Orange-tip *Anthocharis cardamines*	×		×	
White-letter hairstreak *Satyrium w-album*			×	
Small copper *Lycaena phlaeas*			×	
Common blue *Polyommatus icarus*	×	×	×	
Holly blue *Celastrina argiolus*	×	×	×	×
Red admiral *Vanessa atalanta*	×	×	×	×
Painted lady *Vanessa cardui*	×	×	×	×
Small tortoiseshell *Aglais urticae*	×	×	×	×
Camberwell beauty *Nymphalis antiopa*			×	
Peacock *Inachis io*	×	×	×	×
Comma *Polygonia c-album*	×	×	×	×
Speckled wood *Pararge aegeria*	×	×	×	×
Marbled white *Melanargia galathea*			×	
Gatekeeper *Pyronia tithonus*	?		×	
Meadow brown *Maniola jurtina*	×		×	

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Bird watching in Hyde Park and Kensington Gardens — some personal reflections

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I welcome this opportunity to share with you some of the many pleasant experiences I have had while birdwatching in the central Royal Parks, and about the changes in the bird species that I have witnessed during my 'watch' in the parks, which began almost fifty years ago in 1956. Although the early mornings in spring and autumn are the best times to see migrants, both on the ground and overflying the parks, unexpected birds can appear at almost any time.

Top ten memories

I have picked out my 'top ten' memories that came to mind when I was preparing this talk, all from Hyde Park or Kensington Gardens.

1. A day in January 1962, after several days of freezing weather. Lapwings and skylarks were flying over the park, quite low, some began landing on the football pitches just in front of where I was standing. There may have been some unfrozen water in the rutted ground. Shortly afterwards a drake smew landed practically beside me on an unfrozen part of The Serpentine.

2. The day that a kestrel brushed the side of my head as it shot past to grab an unsuspecting sparrow from a small flock feeding just in front of me, by The Serpentine Lido.

3. In October 1973, at lunchtime, a merlin perched briefly in front of me beside The Long Water, before flying off rapidly, either with prey, or were they jesses?

4. I arrived at my office, which overlooked Hyde Park, to be handed a woodcock by the commissionaire. It had apparently hit the building during the night in March 1977. I took it to a Hertfordshire wood and released it.

5. Another bird that I was able to help was a young tawny owl that had fallen from a tree and was rescued from a dog. As the plane trees from which it had fallen are a bit on the high side, I could not leave the bird in a safe place near the parents, so took it to Malcolm Kerr on Duck Island, who cared for it until it was old enough to release.

6. A hoopoe flying around Kensington Gardens at lunchtime in November 1967. A colleague and I had marvellous views of this beautiful bird, which was a 'first' for Inner London.

7. One not so pleasant experience was when I decided to try to find out how many tawny owls there were in Kensington Gardens. The park closes at dusk, so I obtained a key and entered the park near to The Serpentine bridge. It was late in the year and totally dark! I headed for the distant glow in the Bayswater Road, listening for an owl. After a while I was certain that I was being followed, but I could see nothing. When I stopped so did the 'person' following me, the roots in my scalp tingled! Walking faster did not help, the 'thing' was keeping up with me! A brainwave — I would walk backwards. Then I realized that my movement was just sufficient to create a small breeze that lifted the dead leaves from the ground , creating a soft crunch as they fell back to the ground. I had had enough by then, so there is no record of my findings. (We are always looking for volunteers with some spare time in the evenings!)

8. A very memorable lunch hour in 1967 was when an osprey decided to stop for a feed by The Serpentine bridge. I managed to catch up with two colleagues and bring them back to witness this wonderful sight, before the bird gained height and flew off north.

9. In 1999 I saw my first kingfisher in London. Although I have ringed many, it was still a thrill to see one on my own 'patch'.

10. Finally a day in 1965 when I was drawn to a nuthatch nest hole by the birds' excitable call. It was then that I met Chris Hawes and Charlie Parsons, the official recorders for Hyde Park and Kensington Gardens at that time. They later invited me to join them on the Committee on Bird Sanctuaries in the Royal Parks, and so began my deeper involvement with the Royal Parks.

I have left out the many thrills that one experiences when birds that usually fly away, come towards you or even land on an outstretched hand for food. Alongside The Long Water it is not unusual to have blue tit, great tit or robin perching on your finger for a peanut. Many other species will take food in flight, even a common gull has occasionally joined the black-headed gulls in winter to take a piece of cheese. I watched a woman feed chicken breasts to a heron there, that could surely only happen in Kensington! Kensington Gardens is such a wonderful place to introduce wild birds to young people, the next generation of bird recorders.

Changes in the bird life of Hyde Park and Kensington Gardens

There is a greater diversity of breeding species now than fifty years ago. Looking back it was quite a surprise to note down the changes over that time.

Losses

1970 Jackdaw
1999 Spotted flycatcher
2001 House sparrow

Gains

1963 Canada goose
1966 Pochard
1967 Blackcap
1971 Magpie
1972 Great crested grebe
1978 House martin
1995 Great spotted woodpecker
1997 Green woodpecker
1999 Grey lag goose
2003 Little grebe?

There have been isolated breeding or attempted breeding of some species before these dates, but these are when the species began regular nesting. Other species giving hope for the future list of regular breeding species include reed warbler; common tern and chiffchaff. That list should also probably include rose-ringed (or ring-necked) parakeet, now being seen regularly in the park.

To keep a check on what is going on we do, of course, have to rely on observers willing to give up some free time. We are very fortunate at the moment to have five dedicated observers who regularly do a Standard Walk every month in the two parks, with extra walks during the nesting season. If you are able to help, or can keep casual records, do get in touch.

Book reviews

Beguiled by birds. Ian Wallace on British birdwatching. Ian Wallace. Christopher Helm/A & C Black. London. 2004. Hardback. 272 pp. £29.99. ISBN 0 7136 6535 1.

A bird in the bush. A social history of birdwatching. Stephen Moss. Aurum Press. London. Hardback. 2004. 375 pp. £16.99. ISBN 1 85410 993 6. Paperback 2005. £8.99. ISBN 1 85413 085 5.

Unusually for a review, may I commence with a misgiving. I had read both books one quickly after the other long before the request for a review and I have struggled with my initial response that while I took ages to read the D. I. M. Wallace, I much preferred it! So my comments may assist the casual reader thinking they could get away looking at just one of these publications.

There have recently been several histories either social or providing the background to the finders or collectors. On the social side, Mark Cocker's *Birders: Tales of a Tribe* provides an enjoyable guide to twitching — and there is surprisingly little repetition with Stephen Moss despite the overlap in contributors. For a more international approach the works by Barbara and Richard Mearns on Western Paleartic, North American naturalists and bird collectors can be recommended. And, slightly older, David Allen's *The Naturalist in Britain* provides the fuller picture — not just birding.

Moss has aimed to explain why birding is one of the world's most popular pastimes. His book is divided into seventeen themed chapters, starting with Observing and the pioneers, Gilbert White, Thomas Bewick, John Clare and George Montagu (of harrier fame). The next twelve chapters progress through the development of birding within the social setting such as Counting *Between the Wars* up to chapters on twitching and the current commerciality of birding. He then has an intriguing chapter on why there are so few female birdwatchers, and a final chapter linking social and technological changes while wondering if birding is necessarily ever more politically organized as the numbers of birds is in decline.

I found the chapters on Escaping, *World War II*, and Learning, *1945–1958*, particularly intriguing as the POW experiences of Peter Conder and John Buxton among others are well described. The references to James Fisher in the USA were also new to me. I found the chapters after then fairly familiar and there does appear to be a certain orthodoxy in the examples, whether it is just the same names and places. But, and this must be stressed, *A bird in the bush* is a stylishy written guide which covers the ground very well and if you were starting birding now, the background is excellent. Actually, if you had been birding for years there is still plenty here — I imagine a considerable pruning limited the book to 375 pages. Very good value, especially in paperback.

Orthodox certainly is not the adjective for D. I. M. Wallace's personal view on British birdwatching. Again a chronological view of birdwatching from earliest times to the current within the personal perspective of a lifetime's birding. The illustrations are of course very good and the photographs often intriguing to identify the individuals, many of whom were, or still are, ornithologists of high international, national or local status. A charming 'Wallaceism' is that the unidentified ladies in the photographs are referred to in the captions as 'pretty girls'. The setting is primarily the British Isles but Wallace's travels to Jordan, Nigeria, Mongolia, etc. add rather more than just foreign colour but show the social development and the changes to British birding.

It is rather difficult to pinpoint exactly where this book fits for it is not autobiography but contains considerable personal detail. It is more a memoir than social history but as Wallace can describe the London birding scene in the 1950s and 1960s and the creation of the St Agnes Bird Observatory, there is plenty for the London Natural History Society member who either remembers the individuals or who wonders who those distant *London Bird Report* names really were.

Wallace brings to life a series of individuals whose achievements were simply impressive — indeed 'Look upon such men and their works ye twitchers and quail . . .'.

The detail is impressive and the chapters on the modern birder have been in part built up from a list of contributors so this part is more than just Ian Wallace's view. But his personal views on twitching and modern birding are his own — the book is simply worth reading for his views here will inspire debate if not agreement.

Several other reviewers, especially in *British Wildlife* and *British Birds*, have commented on the written style and found it over-involved and complex. I would agree for this is not an easy read but there is a lot there especially for those with an interest in the future of birding in London. The cautioning end note is that both books have references to the LNHS, but as the meeting places of the past rather than the current or future.

I would recommend both these books especially as *A bird in the bush* is available in paperback. While *Beguiled by birds* is a classic winter read with the wonderful disadvantage of wanting to make you get out birding — and with a real purpose to those sightings.

MICHAEL WILSDON

Horse chestnuts and buckeyes in London

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Summary

Both these common tree names refer to species belonging to the genus *Aesculus* of the family Hippocastanaceae. In all, it comprises about twenty-five species, around half being of North American origin. Others are from Europe, India and the Far East. The following notes indicate where many of the forms of horse chestnut and buckeye can be seen in Greater London. The best collection of *Aesculus* species is in the Royal Botanic Gardens at Kew. It is not detailed here but some rarities, otherwise absent or very rare elsewhere, are mentioned. There are good selections in Hyde Park and Kensington Gardens, and Syon Park has a specialized assortment.

Species

Aesculus hippocastanum common horse chestnut is familiar to all, with its abundance of pink-white blossom in spring and showers of glossy conkers in autumn. It was introduced here in 1616 from homelands in northern Greece and Albania.

A. pavia red buckeye, from SE USA in 1711, is a much less vigorous tree and scarce here, but it is a valuable component of successful hybrids.

A. flava yellow buckeye arrived in 1764 from the same region and is now an occasional attractive feature of London parks. Confusingly, it sometimes (in f. *virginica*) has red flowers.

A. parviflora bottlebrush buckeye, a shrubby plant, came from the USA in 1785.

A. glabra Ohio buckeye was introduced *c.*1809 — it has inconspicuous yellow/green flowers and is very rare.

A. californica, a shrubby plant, came from California about 1850.

A. indica Indian horse chestnut, brought from the Himalayas in 1851, has become a popular London tree. It blooms profusely in early summer, when *A. hippocastanum* flowering is over.

A. turbinata Japanese horse chestnut was introduced before 1880. It is very similar to the European horse chestnut but its conker-husks are smooth instead of spiny. It remains rare here.

A. sylvatica, a small tree with reddish flowers, was introduced from the USA in 1905 and is rare. There is a young specimen in Syon Park.

A. wilsonii was introduced in 1908 from China. There is an old tree at Kew near the Pavilion Café and a young tree at Syon Park, planted in 2005.

A. chinensis was introduced from China in 1912. There is a tree close to the 'White Peaks' at Kew, apparently the only London example.

Hybrids

From the above modest range of *Aesculus* species several useful hybrids have evolved. *Aesculus* × *carnea* (*A. hippocastanum* × *A. pavia*) red horse chestnut

was known in Europe before 1820, and has long been a popular London tree. Mitchell (1994) scorned it as a 'dull dark tree of poor crown, foliage and flowers', but Johnson (2004) finds it to be 'of rather endearing ugliness'. The 'Briotii' version (1858), with smoother leaves and brighter flowers, is now more popular. A scarce variant is the low dome-shaped 'Plantierensis' (France *c.*1894), noted for its fine panicles of pink-and-apricot blossom.

A different combination (*Aesculus flava* × *A. pavia*) produced *A.* × *hybrida* hybrid buckeye by 1815. In a good setting this forms a tall elegant tree. It has slender glossy leaflets, and red yellow-tinged flowers with glandular petals — when shed they may stick to the shoes of passers-by.

Aesculus × *mutabilis* (*A. pavia* × *A. sylvatica*) was raised about 1834.

Dallimore's chestnut *Aesculus* 'Dallimorei' is a chimaera, the result of fusion between a graft of *A. flava* and its *hippocastanum* stock. The resulting unusual shoot was noted in Kent during 1955 by William Dallimore, a retired director of Kew. It is now in cultivation, and is distinguished by large panicles of creamy flowers which develop red blotches as they mature.

London locations

The following list indicates parks and streets where most of the above-mentioned forms of horse chestnut and buckeye may be seen by Londoners. A few of the rarest appear to be present only at Kew, where there is a fine *Aesculus* collection around the Pavilion Café. Kensington Gardens has a Chestnut Quarter (west of the Peter Pan enclosure) with an assortment of old and young *Aesculus*, and there is another good collection in Hyde Park near the Lido car park. A wide variety can be seen in Syon Park.

Aesculus californica Californian buckeye. Uncommon. A bushy species with narrow tapered leaflets and slim erect panicles of pink or white flowers.
Battersea Park – two old trees on south side of Woodland Walk.
Kennington Park – two old trees.
Ravenscourt Park – three old trees in dog exercise enclosure.

Aesculus × *carnea* red horse chestnut. Common. An old-fashioned favourite with warty trunk, crumpled leaves and dull-red yellow-tinged flowers. Today the more popular form is *A.* × *carnea* cv. Briotii, which has bright pink flowers splashed with red and yellow. Increasingly planted in parks and streets. There are good examples in Hyde Park near the Lido car park, and in Kensington Gardens in the area designated 'Chestnut Quarter' on a map of *c.*1734 (between Peter Pan and Speke monuments). Three specimens of the scarce 'Plantierensis' are within the Diana memorial fountain enclosure. They are multi-stemmed young trees, only beginning to reach flowering age (Figure 1).

Aesculus chinensis Chinese horse chestnut. White-flowered. Very rare. A mature specimen at Kew beside 'White Peaks' complex.

Aesculus 'Dallimorei' Dallimore's chestnut. Large floppy leaves with long red petioles, and creamy-yellow flowers which develop brick-red blotches. Young trees in Kensington Gardens Chestnut Quarter.

Aesculus flava yellow buckeye. Occasional. Usually with yellow blossom, but sometimes (f. *virginica*) red-flowered.
YELLOW-FLOWERED FORM
Hanwell, City of Westminster cemetery — five specimens (275, 308, 392, 508, 560).
Hanwell, Kensington & Chelsea cemetery — several old trees line entrance path (a specimen of *A.* × *hybrida* among them).
Hyde Park near Lido car park — several young trees.
Kensington Gardens — good mature tree north of Flower Walk and young specimens in Chestnut Quarter.
Ravenscourt Park — two mature trees.
Victoria Park, Hackney — several old trees east of Crown Gates.
RED-FLOWERED FORM
Hanwell, City of Westminster cemetery — one tree (615).
Myddelton House, Enfield — old tree by path from entrance.
Victoria Park, Hackney, old tree between Crown Gates and Skew Bridge.

FIGURE 1. *Aesculus* × *carnea* 'Plantierensis' by Diana Fountain, Hyde Park, June 2005.

FIGURE 2. *Aesculus glabra* Ohio buckeye near the Lido in Hyde Park, May 2003.

FIGURE 3. *Aesculus* × *hybrida*, hybrid buckeye, two trees east of Serpentine Bridge, Hyde Park, May 2003 (one now dying).

FIGURE 4. *Aesculus* × *mutabilis*, rare hybrid horse chestnut, close to Sloane Square, May 2003.

Photos: Elinor Wiltshire

Aesculus glabra Ohio buckeye. Very rare. Yellowish flowers with short petals and prominent stamens. Young tree by Lido car park (Figure 2); veteran in Syon Park.

Aesculus hippocastanum horse chestnut. Common. The double-flowered form, 'Baumannii', is occasionally present.

Aesculus × *hybrida* hybrid buckeye. An elegant tree, with smooth slender foliage and attractive yellow-tinged red flowers — a Victorian favourite which needs to be revived.
Hanwell, Kensington & Chelsea cemetery — old tree among *A. flava* near entrance.
Hyde Park, east of Serpentine Bridge — two tall slender specimens (Figure 3) but one is now dying.
Regent's Park, by St Katherine's Gate — malformed old tree.
Victoria Park, Hackney — two near lake on West side, on either side of path; four on East side, in vicinity of Burdett-Coutts memorial fountain, all old trees.

Aesculus indica Indian horse chestnut. Attractive tree with slender leaflets and abundant pink blossom in June. Increasingly planted in London parks and streets — many good examples in Kensington Gardens.

Aesculus × *mutabilis*. Rare. White petals with yellow patches, which later turn red.
D'Oyley Street, Chelsea — a small tree (Figure 4).
Kew — by Pavilion Café.

Aesculus parviflora bottlebrush buckeye. Spreading shrub, white flowers with protruding red anthers. Another Victorian favourite in need of restoration.
Holland Park — old specimen in Oak Enclosure; young plants in Formal Garden.

Aesculus pavia red buckeye. Rare. Small to medium tree with slender crimson flowers.
Hanwell, City of Westminster cemetery — one specimen (331).

Aesculus sylvatica. Rare. Small tree with orange-red flowers.
Syon Park — young specimen.

Aesculus turbinata Japanese horse chestnut. Rare. Very similar to common horse chestnut, but distinguishable by smooth conker-husks.
Hyde Park, near Triangle car park east of Serpentine Bridge — three old trees.
Kensington Gardens — old tree south of Round Pond; young tree, planted 2005.
Brompton Cemetery — a young tree, planted 2005.

Aesculus wilsonii. Very rare. White flowers with yellow centres, becoming red.
Kew — old tree by Pavilion Café.
Syon Park — a young tree planted in 2005.

Conclusion

The object of this outline list of the species, hybrids and cultivars of the genus *Aesculus* is to indicate sites where a selection of these beautiful trees can be found in Greater London. For full descriptions and indications of flowering times reference should be made to tree guides.

Anybody who tracks down the rarer specimens will be dismayed to find how many appear to be almost at the end of their lives. The days of adventurous planting seem to belong to the past. If the beauty and distinction of London's parks is to be preserved, it is time to recover the vision and energy of their creators.

Acknowledgements

Grateful acknowledgement is made for contributions from Paul Akers (for particulars of City of Westminster cemetery at Hanwell), Nick Bentley, Nick Butler, Peter Hudson, Tom Jarvis and Topher Martyn. Special thanks to Owen Johnson for valuable assistance.

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The changing status of musk stork's-bill *Erodium moschatum* (L.) L'Hér. in the London Area

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Abstract

From 1940 or earlier until 1984, *Erodium moschatum* occurred in the London Area a few times only, in circumstances which suggest a wool-alien origin. Later records are more numerous, and certainly of different origin. Transport on the fur of dogs is proposed as an explanation for many of these records.

Introduction

According to Preston (1994: 157), '. . . in south-west England . . . most of the persistent populations [of musk stork's-bill, a nationally scarce species of flowering plant] . . . grow in ruderal habitats near the sea, and are typically found on roadside banks and verges, pathsides, the sides and tops of Cornish "hedges", trampled turf and waste ground. *Medicago arabica*, another coastal ruderal, is a frequent associate, as is *E. cicutarium* where the soil is sandy . . . [In other parts of Britain] it is often found as a casual inland . . . and it was regularly introduced with wool shoddy'. This last phrase may need some explanation. The woollen industry, mostly in Yorkshire, imported wool in bulk from Australia, South Africa and Argentina. 'Shoddy' is used in this instance as a term for the waste created by the process of cleaning the wool before it is spun. It consists of scraps of dirty wool, in which are caught-up seeds of plants infesting the range, many of which were originally introduced to those countries from Europe in the wool of live sheep. The seeds of *Erodium* are adapted for drilling themselves into soft soil, being sharp at the tip and at the other end having a long spirally coiled 'tail' which opens up or closes according to the weather. Hairs on the seed and tail do not prevent the seed from being pushed into the ground sharp end first, but make it less likely that the seed will be pulled out again. The same process makes it possible for *Erodium* seeds to get ever deeper into the fleece of sheep. Shoddy has been used over a long period as a soil conditioner, especially for planting fruit trees, hops and vegetables on thin sandy soils. Fields and orchards treated in this way produced a great variety of unusual weeds, as did the railway sidings where the shoddy was unloaded. The 529 species listed by Lousley (1962) include ten *Erodium* species, a number exceed only by *Amaranthus*, *Chenopodium*, *Trifolium* and the grass genera *Bromus* s.l., *Eragrostis* and *Hordeum*. For a few years around 1970, the programme of the London Natural History Society (LNHS) included an annual late summer Botany Section field meeting to Blackmoor Fruit Farm. This farm in Hampshire had an extensive acreage of soft fruit which was treated every year with shoddy, and could usually be relied upon to offer an extraordinary assortment of exotic grasses, mixed with large numbers of plants of prickly-fruited *Medicago, Erodium* and much else. Increasing transportation costs have made the movement of shoddy uneconomic, and in the last ten years or so only fields in West Yorkshire, closer to the mills, have provided fresh supplies of wool-alien plants.

Musk stork's-bill in the London Area to 1984

County floras of Surrey and Hertfordshire show a thin scattering of records of *Erodium moschatum* of unexplained origin and always in small quantity, which are not considered further; they are shown by some of the crosses on the map

in Preston (1994). The first London Area records of this species by LNHS members, on Thanet Sand at Stonehill Green near Hextable, were by D. McClintock in 1948 (data held at the Biological Records Centre, Monks Wood) and by Lousley the following year, when it was plentiful, along with *E. cygnorum, E. botrys* and three *Medicago* species. Lousley's reports of the site (1949: 27 and 1950: 9) leave no doubt that all the plants mentioned and many others were wool aliens. *M. polymorpha* persisted in the area at least until 1984. In 1971, J. R. Palmer found an abundance of *E. moschatum* in mature apple orchards at Lane End, Darenth. In 1975, Mrs J. Pitt found a strong colony of this plant on a south-facing grassy bank on sandy soil near Poverest Road School, Orpington; this area of postwar housing had previously been an orchard. The plant has persisted here for another thirty years. There is no evidence to support this suggestion, but it seems likely that both these orchards had at some time been manured with shoddy. Mr Palmer found the plant twice more in places known to have had a past association with shoddy, both cabbage fields, at Southfleet in 1978 and Horton Kirby in 1984. All the records detailed in this paragraph are represented by crosses on the map (Figure 1).

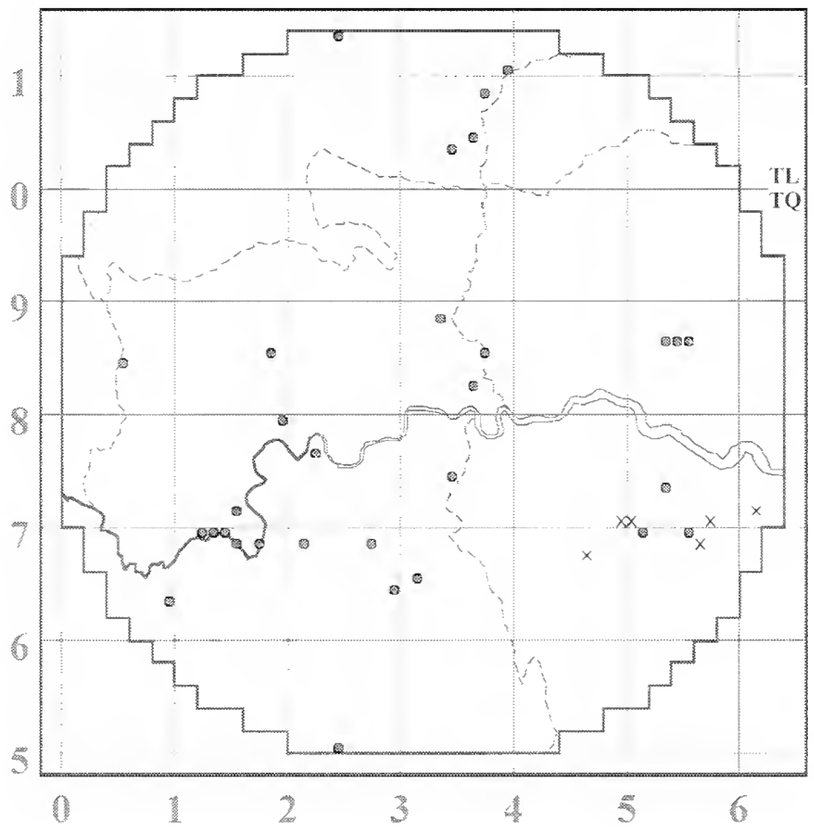

FIGURE 1. Distribution of musk stork's-bill *Erodium moschatum* in the London Area. See text for explanation of symbols.

Musk stork's-bill in the London Area since 1984

The remaining records mapped are evidently more numerous; they indicate later records, none of which can be linked to shoddy. Only three of them date from the 1980s. P. J. Edwards found *E. moschatum* on roadside waste land at Wembley Park in 1984; nothing is known about the size and subsequent fate of this population. In 1987, the Bristol botanist A. L. Grenfell came across a quantity of the plant in a grassy place by the Thames at Hampton. It is now in several places in Hampton, from near the Oldfield Works to Garrick Lawn, which is perhaps Grenfell's site. In 1989, R. M. Harley found two patches of *E. moschatum* on waste ground in Teddington; this is probably not the same site as the one where Miss P. A. Hyde found it in 2004, and as there are three other recent known sites between Hampton and Teddington it may now be well scattered in the western part of the borough of Richmond upon Thames. Twelve more sites discovered in 1991–9 and sixteen in 2000–4 complete the

data set, with quantities of plants varying from one to 'hundreds'. It is remarkable how large a proportion of these records are the result of surveys for new county floras (the five sites in Hertfordshire, the three in the Borough of Havering), surveys for a national project (Local Change in Hampton) or systematic exploration of an enthusiast's home area (the three sites in Kent). Only one record results from a formal survey of a potential site of nature conservation importance. There must be many more populations waiting to be discovered.

Discussion

No mention has been made of the habitats of the more recent occurrences of *Erodium moschatum*, but they are the first topic to be considered in any search for an explanation of their origin and sudden increase. The habitat data available are too incomplete in different ways for a tabulation to be helpful, but a few recurring themes can be observed. The three mentions of substrate specify gravelly ground, but as one of these was 'following road works', another was at a sewage works and the third was a canal path, the gravel is likely to have been imported in all cases. My own observations of *Erodium moschatum* in London have been on Terrace Gravels at Hampton, often associated with spotted bur-medick *Medicago arabica*, and in one place on sandy soil; the latter is also the only cemetery mentioned, and the only place where *E. cicutarium* was reported at the same time. Considering the sites in terms of land use, it is remarkable how many (fourteen) are from grass alongside a track or roadside pavement. A further seven are from recreation grounds, parks or the surrounds of blocks of flats.

I believe it is these twenty-one sites which provide the clue to the origin of most of the recent populations of *Erodium moschatum* in the London Area. The relative abundance of the species in similar habitats in south-west England, together with the ease with which the plant's disseminules can be transported in wool, suggest to me that the plant has very probably been transported in the fur of dogs brought back by car from seaside holidays in Cornwall to their usual place of exercise, where they were allowed a good scratch. The increase of the plant during the last twenty years could then be related to the increase in the number of dogs being walked here. I know of no studies of plant material combed from dogs' fur, but I can offer a personal observation that agrimony *Agrimonia eupatoria*, a plant whose fruits are effective small burs, was introduced to my own garden in this way. The same animal rapidly became covered in pirri-pirri burs, the fruits of *Acaena novae-zelandiae*, on a visit to Holy Island in Northumberland, where this species is a well-established wool-alien (Swan 1993: 146), but we managed to pull or cut all of these off her on-site. The movement of dogs would also help to explain the increase of *Medicago arabica*, another bur-fruited species, which puzzled Pearman (2002: 393).

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Book reviews

Fungi. Brian Spooner and Peter Roberts. New Naturalist 96, Collins, London. 2005. 594 pp. Softback, £25, ISBN 0 00 220153 4; hardback, £40, ISBN 0 00 220152 6.

This book is the successor to John Ramsbottom's *Mushrooms and toadstools* published in the New Naturalist library as volume 7 in 1953. The reviews of the Ramsbottom volume were ecstatic and it ran to many impressions (I have the seventh) becoming a classic of the genre. Was that famous photo sequence of a toad climbing onto a toadstool posed? How do you pose a toad anyway? Will Spooner and Roberts achieve cult status and become a classic of the new New Naturalist library?

I can't answer the first two questions but I am certain the answer to the third question is yes. This wonderful book, lucid, discursive, comprehensive, endlessly fascinating and informative, is quite the best introduction to the world of fungi that I have ever read. It is much more than an introduction, going into considerable depth in some areas yet managing not to lose the reader in academic complexities.

The plan is remarkably well thought out and meets the challenge the authors faced of covering a whole kingdom of life in fewer than 600 pages including the index. Few other books in the New Naturalist series face such a challenge.

The first seven chapters cover phylogeny, evolution, diversity, life styles and dispersal. Heavy physiology and biochemistry are excluded and left to the academic texts — a wise decision in my view. Chapters 8–14 cover the range of habitats that fungi colonize. Chapter 15 on health and chapter 16 on folklore and traditional use are quite splendid excursions into their subject areas, even if (I think) they have been a little uncharitable to Gordon Wasson. Chapter 17 on food and technology and chapter 18 on conservation round of a tour de force of popular exposition at the highest level.

Buy it and read it for pure pleasure as well as education, you won't regret it and you will never again ignore the fifth kingdom.

EDWARD TUDDENHAM

Illustrations of alien plants of the British Isles. E. J. Clement, D. P. J. Smith, and I. R. Thirlwell. Botanical Society of the British Isles. 2005. 466 pp., paperback. £18.75 + £5 p & p. ISBN 0 901158 32 1. Obtainable from Summerfield Books, Main Street, Brough, Cumbria CA17 4AX (Tel. 01768 341577).

The need for a volume of alien plant illustrations to supplement the all too few that are included in Stella Ross-Craig's incomparable *Drawings of British plants* has long been felt. This new publication makes a huge, and most welcome contribution to filling the gap. It has had a long gestation period. Some of the illustrations date back to the early 1960s when David McClintock first started organizing a group of gifted amateur artists to set about the daunting task. David's ambition had been to produce a magnificent new descriptive and illustrative alien plant volume in the format of a third volume to R. W. Butcher's *A new illustrated British flora.* Sadly this was not achieved, and when David died in November 2001, it fell to Eric Clement to pick up the baton. He and his fellow authors have now ensured that the enormous amount of work and botanical skill that had already been undertaken was not wasted and has now seen the light of day. They also took the opportunity to fill some of the obvious gaps with more recently volunteered drawings.

The book consists of a total of 444 separate plates, each illustrating an individual alien plant species. These plants range from the common and widespread (e.g. butterfly bush, Canadian goldenrod), to the distinctly rare and local. Each plate presents a line drawing of the plant that illustrates its habit, and shows details of its diagnostic features in the style of Ross-Craig. Thirteen individual artists have contributed plates, and it is remarkable what a uniformly high standard of work has been achieved. The plates are arranged in the order of Stace's *New flora of the British Isles* (second edition, 1997), and for each plate there is a useful cross reference to the relevant page entry in both editions of this flora. None of the plates has been previously published.

This splendid book has arrived at an opportune time. The increasing diversity of alien plants and their increasing geographical spread is likely to be one consequence of global warming. The detailed illustrations will facilitate the accurate identification of such plants, and enable us to track their movements with more confidence.

DAVID BEVAN

The myxomycetes of the London Area

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Abstract

Two hundred and fifty-two species of myxomycetes are reported from the London Area, i.e. within a twenty-mile (32-kilometre) radius of St Paul's Cathedral. Eighty-nine species are additions to the previous list published in 1965. Most of these additions are the result of the extensive use of moist chamber culture of bark samples from living trees.

Introduction

The myxomycetes of the London Area were last treated as a part of *A hand list of the plants of the London Area* (Ing 1965). Since then considerable field collecting has been carried out by the author and several colleagues. All recent records have been checked by the present author. Many species additional to the area have been found using moist chamber culture techniques, especially in central London (Ing 1998, 1999*b*, 2000). A number of additional literature sources have been uncovered and these have added a few species and numerous locality records. (All literature sources additional to those cited in the 1965 paper are included below). Some older records, where herbarium specimens have been traced, have been redetermined in the light of current species concepts. At the time of writing, March 2005, 252 species have been reliably reported from the Society's recording area, i.e. within a radius of twenty miles (thirty-two kilometres) from St Paul's Cathedral, whilst eighty-nine species are additions to the 1965 list. Nomenclature and arrangement follow Ing (1999*a*) with later modifications suggested by Lado (2001).

The entries are arranged as follows:

- Current ***scientific name***
- *synonyms* (where the name used differs from that in Ing 1965 or 1999*a*)
- An asterisk before the name indicates a species not in the 1965 list
- **Vice-county numbers**, within the area, from which the species has been reported
- Number of sites (when more than twelve) in the area
- If there are more than twelve sites a map, on a tetrad basis, is provided. Where there are less than thirteen records all are listed by **vice-counties**, with details of site, year, collector and the10-km grid squares from which they are known
- Habitat and frequency within the London Area
- A species new to the London Area will also have notes of British and European distribution plus any relevant taxonomic or ecological details

Species list

MYXOMYCOTA

ACRASIOMYCETES

ACRASIDALES

Guttulinaceae

****Pocheina rosea*** (Cienk.) A.R. Loebl. & Tappan [*Guttulina rosea* Cienk.]
VCs **16–18, 20**. 40 sites. Map 1. Common on the acidic bark of living trees. Widespread and common throughout lowland Britain, especially in urban areas.

CERATIOMYXOMYCETES

CERATIOMYXALES

Ceratiomyxaceae

Famintzinia fruticulosa (O.F. Müll.) Lado [*Ceratiomyxa fruticulosa* (O.F. Müll.) T. Macbr.]
16–21, 24. 45 sites. Map 2. Common on rotten wood, especially of conifers.

****F. sphaerosperma*** (Boedijn) Lado [*Ceratiomyxa sphaerosperma* Boedijn]
17: Royal Botanic Gardens, Kew, 2004, A. Henrici. TQ 17. This is the first British record of a tropical species, known from the tropics of America and Asia and also from Israel. The Kew specimen was on litter in the tropical water-lily house. The species differs from *fruticulosa* in the small, discrete fructifications and the globose rather than elliptical spore-like bodies.

MYXOMYCETES

ECHINOSTELIALES

Clastodermataceae

***Clastoderma debaryanum** A. Blytt
17: Royal Botanic Gardens, Kew, 2000, B. Ing. TQ 17. Rare, on bark of living lime trees. A rare species in the British Isles, becoming commoner towards the tropics, where it occurs on fallen woody material as well as the bark of living tees.

Echinosteliaceae

****Echinostelium brooksii*** K.D. Whitney
16–18, 20, 21. 65 sites. Map 3. Common on the acidic bark of living trees. Widespread and common in the British Isles and Europe, especially on conifers.

****E. colliculosum*** K.D. Whitney & H.W. Keller
16–18, 20, 21. 36 sites. Map 4. Frequent on the bark of living trees. Widespread and common in the British Isles and Europe.

****E. corynophorum*** K.D. Whitney
16–18, 21. 25 sites. Map 5. Not uncommon on the bark of living trees. Widespread and frequent in the British Isles and Europe.

****E. fragile*** Nann.-Bremek.
16–18, 21. 40 sites. Map 6. Frequent on the bark of living trees, especially isolated trees in parkland and at roadsides, usually on less acidic bark than that favoured by *E. brooksii*. Widespread and frequent in the British Isles and Europe.

****E. minutum*** de Bary
16–21, 24. 55 sites. Map 7. Common on the bark of living trees, rarely on other substrates. Widespread and common in the British Isles and Europe.

****E. vanderpoelii*** Nann.-Bremek. et al.
17: Royal Botanic Gardens, Kew, 2000, B. Ing. **21**: Buckingham Palace Garden, 1999, B. Ing, TQ 17,27. Uncommon, on the bark of living trees. Described from Scotland and scattered across the British Isles and Europe but confused with *E. apitectum* K.D. Whitney, with which it is synonymized by Lado & Pando (1997). The latter species is recorded from a few sites in the southern half of Britain.

LICEALES

Liceaceae

****Licea belmontiana*** Nann.-Bremek.
17: Royal Botanic Gardens, Kew, 1998, B. Ing. **21**: Downhill Park, Tottenham, 2002, B. Ing. TQ 17, 38. Uncommon, on the bark of living maple and willow trees. Widespread, but uncommon, in the British Isles and Europe.

L. biforis Morgan

16–18, 21. 31 sites. Map 8. Common on the bark of living trees. Increasing in the British Isles and Europe, apparently spreading northwards in the wake of climate change.

L. castanea G. Lister

17: Clapham Common, 1998, B. Ing; Esher Common, 2001, B. Ing; Royal Botanic Gardens, Kew, 2001, B. Ing. TQ 16, 17, 27. Uncommon, on the bark of living trees. Widespread but generally uncommon in Britain and Europe.

L. chelonoides Nann.-Bremek.

21: Hampstead Heath, 1991, B. Ing. TQ 28. Rare, on the bark of living sycamores. Scattered across Britain and Europe but always rare. Distinguished from other plate-bearing species by the deciduous warts on the spores.

L. clarkii Ing

16: one partly localized record. **17**: Esher Common, 1996, B. Spooner. **21**: Hampstead Heath and Waterlow Park, 1999, B. Ing. TQ 16, 28, 46. On dead, arching stems of brambles; probably common. Widespread in the British Isles but mostly unrecognized in Europe.

L. cristallifera Flatau

17: Royal Botanic Gardens, Kew, 2002, B. Ing. TQ 17. Rare, on the bark of a living willow. A recently described species only known from Germany and a few sites in southern England.

L. denudescens H.W. Keller & T.E. Brooks

17, 18, 21. 21 sites. Map 9. Frequent on the bark of living trees. Widespread in Britain and Europe.

L. deplanata Kowalski

17: Mickleham, 1999, A. Henrici. TQ 15. On leaves in box litter, rare. Only known elsewhere from a few specimens from California, Spain, the Isle of Mull and Worcestershire, always on thick, hard leaves. This is the only *Licea* which habitually fruits on leaf litter.

L. eleanorae Ing

17: Royal Botanic Gardens, Kew, 2001, B. Ing. **21**: Holland Park, 1998, B. Ing. TQ 17,28. On the bark of living trees, rare. Known elsewhere from a few sites in Switzerland, Scotland, Radnorshire, Worcestershire and Westmorland.

L. erddigensis Ing

17: Royal Botanic Gardens, Kew, 2001, B. Ing. TQ 17. On the bark of living trees, rare. Known elsewhere from Wales, from where it was described (Ing 1999*a*), and Scotland.

L. inconspicua T.E. Brooks & H.W. Keller

17: Peckham Rye Common, 1998, B. Ing; Royal Botanic Gardens, Kew, 2000, B. Ing; Esher Common, 2001, B. Ing; Horniman Park, 2002, B. Ing. **18**: Snaresbrook, 1997, B. Ing. **21**: Regent's Park, 1988, B. Ing; Parliament Hill Fields, 1999, B. Ing. TQ 16, 17, 28, 37, 38. Rare, on the bark of living trees. Widespread but uncommon in Britain and Europe.

L. kleistobolus G.W. Martin

16–18, 20, 21. 58 sites. Map 10. Common on the acidic bark of living trees. Widespread and common throughout the British Isles and Europe.

L. longa Flatau

17: Royal Botanic Gardens, Kew, 2000, B. Ing. TQ 17. On the bark of living trees, rare. Known elsewhere from Germany, Sussex, Norfolk and Derbyshire.

L. margaritacea Ing

17: Royal Botanic Gardens, Kew, 2002, B. Ing. TQ 17. On the bark of a living magnolia, rare. Only known elsewhere from two sites in Scotland, from where it was described (Ing 2003), one in Wales and one in Switzerland. It is distinctive, with a pearly iridescence when young and, frequently, triangular sporangia.

L. marginata Nann.-Bremek.

16–18, 21. 41 sites. Map 11. Common on the bark of living trees. Widespread and common in Britain and Europe.

L. microscopica D.W. Mitchell

16: Scords Wood, 1999, D.W. Mitchell. **17**: Esher Common, 2001, B. Ing; Royal Botanic Gardens, Kew, 2003, B. Ing. **18**: St James's Park, Walthamstow, 2002, B. Ing. **21**: Gunnersbury Park and Hackney Marsh, 2002, B. Ing; plus partly localized records from **16** and **17**. TQ 15, 16, 17, 38, 46. Probably common on the bark of living elder trees. Widespread and probably common throughout the British Isles and Europe. It is associated with dark green crusts of gelatinous cyanobacteria on the bark and is not confined to elder, having been found on poplars and other trees with absorbent and nutrient-rich bark. Its small size allows it to be missed in cultures, so it is likely to be far commoner than the records suggest.

L. minima Fr.

16–21. 18 sites. Map 12. Frequent on the bark of living trees, on rotting conifer wood and on decaying bracket fungi on logs.

****L. operculata*** (Wingate) G.W. Martin

17, 18, 21. 26 sites. Map 13. Frequent on nutrient-rich bark of living trees. Widespread and increasingly common in the British Isles and frequent throughout Europe.

****L. parasitica*** (Zukal) G.W. Martin

16–21. 88 sites. Map 14. Common on the bark of living trees. This, the commonest species of the genus on tree bark, is common and widespread throughout the British Isles and Europe.

****L. pedicellata*** (H.C. Gilbert) H.C. Gilbert

17: Royal Botanic Gardens, Kew, 2001, B. Ing. TQ 17. Rare, on the bark of living trees. Scattered across Britain and Europe but always uncommon.

****L. perexigua*** T.E. Brooks & H.W. Keller

17: Barnes Common, 1999, B. Ing; Esher Common, 2001, B. Ing; Royal Botanic Gardens, Kew, 2001, B. Ing. TQ 16, 17, 27. On the bark of living trees, rare. Scattered throughout Britain and Europe but never common.

L. pusilla Schrader

16–18, 21. 14 sites. Map 15. On the acidic bark of living trees and on rotting logs of conifers; frequent.

****L. pygmaea*** (Meylan) Ing

17: Kennington Park and Kew Green, 1998, B. Ing; Wandsworth Park, 1999, B. Ing; Royal Botanic Gardens, Kew, 2000, B. Ing. **18**: Leytonstone, 2002, B. Ing.
21: Buckingham Palace Garden, 1997, B. Ing; Finsbury Park, Highbury Fields and Clapton Square, 1998, B. Ing; Lincoln's Inn Fields and Gospel Oak, 1999, B. Ing.
TQ 17, 27, 28, 37, 38. On the bark of living trees; frequent. Widespread but uncommon throughout Britain and Europe. Probably under-recorded through confusion with *L. pusilla*, of which it was originally described as a variety.

****L. sambucina*** D.W. Mitchell

17: Esher Common, 2001, B. Ing; Royal Botanic Gardens, Kew, 2002, B. Ing.
21: Hackney Marsh, 2002, B. Ing; plus a partly localized record from **16.**
TQ 16, 17, 38, 46. On bark of living elders, or, occasionally on ash, rare. This species was recently described from elder in Sussex and appears to be widespread in SE England but elsewhere it is much less common than *L. microscopica*, on the same tree. Outside the Home Counties it is known from Norfolk, Yorkshire, Ireland and Switzerland.

****L. scintillans*** McHugh & D.W. Mitchell

17: Royal Botanic Gardens, Kew, 2000, A. Henrici. TQ 17. On the bark of a fallen elm trunk. This rare species is only known from a few sites in Britain and Ireland, where it occurs typically on the trunks of living trees. However, many corticolous myxomycetes remain on the bark and are found fruiting on fallen trunks and branches.

****L. scyphoides*** T.E. Brooks & H.E. Keller

16: Scords Wood, 1999, D.W. Mitchell. **17**: Streatham Common, 1999, B. Ing; Royal Botanic Gardens, Kew, 2000, B. Ing. **21**: Buckingham Palace Garden, 1997, B. Ing; Holland Park, 1998, B. Ing; Gospel Oak, 1999, B. Ing; Gladstone Park, 2002, B. Ing; plus a partly localized record from **16**. TQ 17, 27, 28, 37, 45, 46. On the bark of living trees, especially that with good water-holding properties. Widespread and frequent in the western parts of the British Isles, rare elsewhere; in Europe mostly in moist valleys in the mountains. The occurrence of such an Atlantic species in the London Area is unusual.

L. tenera E. Jahn

17: Mickleham, 1995, A. Henrici; Royal Botanic Gardens, Kew, 2000, B. Ing.
18: Wanstead Park, 1898, A. Lister. **21**: Buckingham Palace Garden, 1997, B. Ing. TQ 15, 17, 27, 48. On the acidic bark of living trees and on fallen branches; rare.

****L. testudinacea*** Nann.-Bremek.

17: Royal Botanic Gardens, Kew, 2000, B. Ing. **21**: Buckingham Palace Garden, 1997, B. Ing; Euston Square, 1998, B. Ing. TQ 17, 27, 28. On the bark of living trees; uncommon. Widespread but uncommon in Britain and Europe. Differs from the more common *L. minima* and *L. pusilla* by the larger number of plates in the peridium of the sporangium and by spore characters. Some of the older records under these species may belong here.

L. variabilis Schrader

17, 18, 20, 21, 24. 16 sites. Map 16. On decorticated branches of conifers on the forest floor; frequent.

Cribrariaceae

Cribraria argillacea (Pers.) Pers.
16–21, 24. 37 sites. Map 17. Common on rotten coniferous wood.

C. aurantiaca Schrader
16–21, 24. 41 sites. Map 18. Common on rotten coniferous wood.

C. cancellata (Batsch) Nann.-Bremek.
17, 18, 20, 21, 24. 29 sites. Map 19. Fairly common on rotten wood of conifers and occasionally on birch.

C. intricata Schrader
17: Weybridge (Massee 1892); Kew (Massee 1906); Woburn Park. 1922, P.J. Alexander; Mickleham, 1992, A. Henrici. TQ 06, 15, 17. Rare; on rotten wood, not exclusively on conifer.

****C. macrocarpa*** Schrader
20: Whippendell Wood (Holden 1967); Bayfordbury, 1970, S. Carter. TQ 09; TL 31. Rare; on rotten conifer wood. Uncommon in Britain and most of Europe.

****C. microcarpa*** Schrader
17: Mickleham, 1992, A. Henrici. TQ 15. Rare; on wet conifer trunks covered with liverworts or cyanobacteria. Rare in Britain and Europe but common in the tropics.

****C. mirabilis*** (Rostaf.) Massee
17: St. George's Hill, Weybridge, 1912, G. Lister. TQ 06. Rare; on conifer stumps. Uncommon in Britain and Europe and confined to regions of coniferous forest.

C. persoonii Nann.-Bremek. [*vulgaris* Schrader, in part]
16: Abbey Wood, 1926, St J. Marriott (**BM** — as *vulgaris*) **17**: Woburn Park (Alexander, 1923 — as *vulgaris*); Ockham Common, 1970, B. Ing; Arbrook Common, 1981, B.M. Spooner. **20**: Whippendell Woods and Bishop's Wood, 1969, B. Ing; Sherrards Park Wood, 1996, K. Robinson; plus a partly localized record from **16**. TQ 05, 06, 09, 16, 46, 47; TL 21. On rotten conifer wood; uncommon.

C. pyriformis Schrader [incl. var. *notabilis* Rex]
17: Oxshott, 1969, P.C. Holland; Ockham Common, 1970, B. Ing. **20**: Brookman's Park, 1997, K. Robinson. **24**: Black Park, Iver, 1962, B. Ing. TQ 05,08,16; TL 20. On rotten coniferous wood and sawdust; uncommon.

C. rufa (Roth) Rostaf.
16–18, 20, 21, 24. 23 sites. Map 20. On rotten conifer wood; common.

****C. tenella*** Schrader
17: Woburn Park (Alexander 1923); Mickleham, 1988, A. Henrici. TQ 06, 15. On rotten wood, usually of oak of beech, less often on conifer; uncommon. Widespread in Britain and Europe but never a common species.

C. violacea Rex
16: Abbey Wood (Marriott 1925). **17**: Mickleham, 1992, A. Henrici. **20**: Well Wood, Northaw, 1967, B. Ing. **21**: Perivale Wood, 1991, A. Henrici. TQ 15, 18, 47; TL 20. On fallen twigs and branches and on bark of living trees; uncommon.

Lindbladia tubulina Fr. [*effusa* (Ehrenb.) Rostaf.]
17: Oxshott, 1922, G. Lister; Kew (Massee 1892). **18**: Epping Forest (Massee 1892) **24**: Black Park, 1962, B. Ing. TQ 08, 16, 17, 49. On coniferous sawdust; uncommon.

Dictydiaethaliaceae

Dictydiaethalium plumbeum (Schum.) Rostaf.
16–21. 37 sites. Map 21. On logs and fallen branches, especially of beech; frequent.

Reticulariaceae

****Lycogala confusum*** Nenn.-Bremek. ex Ing [*L. epidendrum* var. *tesselatum* Lister]
18: Shenfield, 1922, ? coll. (**BM**) TQ 69. On fallen trunks, especially of beech, rare. An uncommon species, much confused with *L. exiguum*. Known from Surrey, but outside the Society's area.

****L. conicum*** Pers.
20: Whippendell Wood, 1969, B. Ing. TQ 09. On fallen logs, especially of beech, in ancient woodland; rare. An uncommon species but widespread in Europe, although rare in Britain.

L. epidendrum *sensu lato*
16–21, 24. 98 sites. Map 22. On rotten wood, very common everywhere. This is a composite species, comprising the following species and *L. terrestre*, which have only been separated recently. Most records are therefore of the composite.

L. epidendrum (L.) Fr. *sensu stricto*
16: Chiselhurst, 1966, P.D. Coker. **17**: Esher Common, 1977, B.M. Spooner. **18**: near Wake Arms, 1938, W.D. Graddon, plus two partly localized records from **16**. TQ 16, 47, 49, 56, 57. This species has scarlet plasmodium, a small, dark aethalium and olivaceous or grey spore mass. It is undoubtedly more frequent in the London Area than these few records suggest.

****L. exiguum*** Morgan
17: Wimbledon Common, 1975, D.W. Mitchell. TQ 27. On rotten trunk; rare. This species is decidedly rare in the British Isles and Europe although it very common in the tropics.

L. flavofuscum (Ehrenb.) Rostaf.
16: Anerley, 1992, E. Belton. **17**: Woburn Park (Alexander 1923); Oxshott, 1996, B.M. Spooner. **21**: High Holborn, 1972 (**K**); Perivale Wood, 1992, A. Henrici. TQ 06, 16, 18, 36, 38. Inside hollow trunks and on worked wood; rare.

L. terrestre Fr.
16–18, 20, 24. 25 sites. Map 23. This species has a pink plasmodium, larger, paler aethalia and a pink spore mass. It is by far the commoner of the two segregates in the British Isles and Europe.

Reticularia intermedia Nann.-Bremek. [*Enteridium intermedium* (Nann.-Bremek.) M.L. Farr]
17: Brooklands, 1961, B. Ing; Royal Botanic Gardens, Kew, 2000, A. Henrici. TQ 06, 17. On fallen branches of trees and shrubs; uncommon.

R. jurana Meylan [*E. splendens* (Morgan) T. Macbr. var. *juranum* (Meylan) Harkonen]
17–21. 19 sites. Map 24. On fallen branches and trunks, in summer and autumn; frequent.

R. liceoides (Lister) Nann.-Bremek. [*E. liceoides* (Lister) G. Lister]
17: Weybridge and Oxshott (Alexander 1923.) TQ 06, 16. On conifer branches and stumps; rare.

R. lobata Lister [*E. lobatum* (Lister) M.L. Farr]
16: Abbey Wood (Marriott 1927) **17**: Woburn Park (Alexander 1923); Oxshott (**K**); Brooklands, 1962, B. Ing. **18**: Wanstead Park, 1888, A. Lister (**BM**); Chingford, 1964, P.C. Holland; High Beach, 1903, T. Petch; Thorndon Park, 1966, P.C. Holland. **21**: Northolt, 1910, G. Lister. TQ 06, 16, 18, 39, 47, 48, 49, 69. On the inside of the bark of pine stumps; uncommon.

R. lycoperdon Bull. [*E. lycoperdon* (Bull.) M.L. Farr]
16–21, 24. 83 sites. Map 25. On dead standing trunks, especially of alder, and on fallen wood of all kinds, especially in the spring.

R. olivacea (Ehrenb.) Fr. [*E. olivaceum* Ehrenb.]
16: Abbey Wood (Marriott 1927); Scords Wood, 1972, D.W. Mitchell. **17**: Royal Botanic Gardens, Kew, (Massee 1892); Oxshott, 1917, J. Elliott; Woburn Park (Alexander 1923); Bookham Common, 1963, B. Ing. **18**: Leytonstone (Saunders 1911); Epping Forest (Lister 1918); Chingford, 1960, B.T. Ward. **20**: Potterscrouch Plantation, 1970, B. Ing. **21**: Ruislip Reserve, 1963, B. Ing; Highgate Wood, 1988, P.C. Holland. TQ 06, 08, 15, 16, 17, 28, 38, 39, 45, 47, 49; TL 10. On fallen bark and on smooth logs; uncommon. The var. **simulans* (Rostaf.) Nann.-Brem. [*E. simulans* Rostaf.] which differs from the type only in having free, rather than clustered, spores, has been recorded from Bookham and Ruislip.

Tubulifera arachnoidea Jacq. [*Tubifera ferruginosa* (Batsch) J.F. Gmel.]
16–18, 21, 24. 32 sites. Map 26. Common on rotten conifer trunks and stumps.

Trichiales

Dianemataceae

Calomyxa metallica (Berk.) Niewland
16–21. 35 sites. Map 27. On bark of living trees, occasionally on fallen twigs and litter; common.

Dianema depressum (Lister) Lister
16: Abbey Wood (Marriott 1927) **17**: Woburn Park (Alexander 1923); Box Hill, 1961, B. Ing; Norbury Park, 1998, N. Legon; Royal Botanic Gardens, Kew, 2000, A. Henrici. TQ 06, 15, 17, 47. On rotten branches, usually of ash; uncommon.

****D. harveyi*** Rex
17: Mickleham, 1990, A. Henrici. **20**: Chorleywood, 1969, B. Ing. TQ 09, 15. On fallen twigs and sticks, including those of *Ligustrum*; rare.

Arcyriaceae

Arcyodes incarnata (Alb. & Schwein.) O.F. Cook
17: Woburn Park (Alexander 1923); Royal Botanic Gardens, Kew, 1927, V. Wiltshire; Bookham Common, 1966, P.C. Holland; Tandridge, 1977, P.C. Holland. **18**: Epping Forest (Lister 1918); **20**: Sherrards Park Wood, 1970, B. Ing; Aldenham, 1982, P.C. Holland. **21**: Perivale Wood, 1994, A. Henrici. TQ 06, 15, 17, 18, 19, 35, 49; TL 21. On soggy branches in wet woodland; uncommon.

Arcyria affinis Rostaf.

16: Lullingstone, 1980, I. Palmer. **17**: Reigate and Woburn Park (Alexander 1923); Oxshott, 1928, G. Lister; Royal Botanic Gardens, Kew, 1962, B. Ing. **18**: Epping Forest (Lister 1917); Chingford (Lister 1922), Navestock, 1970, P.C.Holland. **20**: Chorleywood Common, 1963, J.B. Hall. **21**: Harrow Weald Common, 1963, B. Ing; Buckingham Palace Garden, 1997, P.C. Holland; and one partly localized record from **16**. TQ 06, 09, 16, 17, 19, 25, 27, 39, 46, 49, 56, 59. On dead wood, especially of beech; frequent.

A. cinerea (Bull.) Pers.

16–21, 24. 67 sites. Map 28. On damp, rotten, often mossy wood and the bark of living trees; common.

A. denudata (L.) Wettst.

16–21, 24. 82 sites. Map 29. On rotten wood, especially of oak and beech; common.

A. ferruginea Sauter

16–18, 20, 21. 26 sites. Map 30. On rotten wood, predominantly in winter; uncommon.

A. incarnata (Pers.) Pers.

16–21, 24. 64 sites. Map 31. On fallen branches, especially of oak; common.

A. minuta Buchet [*carnea* (Lister) G. Lister]

16: Abbey Wood, 1926, St J. Marriott. **17**: Woburn Park (Alexander 1923); Oxshott, 1928, G. Lister; Royal Botanic Gardens, Kew, 2002, B. Ing. **18**: Wanstead Park, (Lister 1918). **21**: Osterley Park, 1963, A. Stubbs; and one partly localized site in **16**. TQ 06, 16, 17, 46, 47, 48. On fallen wood, and, very rarely, on bark of living trees; generally uncommon.

A. obvelata (Oeder) Onsberg [*nutans* (Bull.) Grev.]

16–18, 20, 21, 24. 47 sites. Map 32. On dry logs and attached, dead branches, especially of beech and oak; common.

A. oerstedtii Rostaf.

16: one partly localized site. **17**: Woburn Park (Alexander 1923); Chipstead, 1965, P.C. Holland; Oxshott, 1966, SLENHS; Tandridge, 1996, P.C. Holland. **18**: Chingford, 1916, J. Ross; Monk Wood, 1961, B. Ing; Epping Forest, 1986, J. Holden. **19**: Copped Hall, 1976, P.C. Holland. **20**: Cole Green, Hertford and Sherrards Park Wood, 1996, K. Robinson. **21**: Stanmore Common, 1927, C. Cooper; Ruislip Woods, 1954, G. Waterhouse. TQ 06, 08, 16, 19, 25, 35, 39, 46, 49; TL 21, 31, 40. On rotten wood of beech and pine; uncommon.

A. pomiformis (Leers) Rostaf.

16–21, 24. 86 sites. Map 33. On fallen branches and on bark of living trees, especially of oak; common.

A. stipata (Schwein.) Lister [*Hemitrichia stipata* (Schwein.) T. Macbr.]

16: one partly localized site. **17**: Margery Wood, 1897, J. Salmon; Selsdon Wood, 1962, B. Ing; Royal Botanic Gardens, Kew, 2003, A. Henrici. **20**: Sopwell, 1974, P.C. Holland. **21**: Buckingham Palace Garden, 1998, A. Henrici; and two partly localized sites in **16** and **17**. TQ 15, 17, 25, 27, 36, 46; TL 10. On stumps and logs; uncommon.

Perichaena chrysosperma (Currey) Lister

16–18, 20, 21. 22 sites. Map 34. On fallen branches and, more commonly, on the bark of living trees; frequent.

P. corticalis (Batsch) Rostaf.

16–21. 31sites. Map 35. On the bark of fallen logs, especially ash; common.

P. depressa Libert

16–21. 35 sites. Map 36. On ash bark, herbivore dung and, rarely, on the bark of living trees; common.

P. liceoides Rostaf.

18: Leytonstone, 1896, A. Lister. TQ 48. On hedge clippings; rare. This rare taxon is also known from herbivore dung and is scattered across Britain and Europe.

P. pedata G. Lister

16: Abbey Wood, 1927, St J. Marriott; Ruxley Pit, 1967, B. Ing.
18: Loughton, 1938, J. Ross. TQ 46, 47, 49. On herbaceous litter in damp places; rare.

P. vermicularis (Schwein.) Rostaf.

16: Bickley (Bevis and Griffin 1909); Scords Wood, 1972, D.W. Mitchell.
17: Woburn Park (Alexander 1923); Barnes Common, 1999, B. Ing; Royal Botanic Gardens, Kew, 2002, B. Ing. **18**: Epping Forest (Ross 1946). **20**: London Colney (Saunders 1911); Bayfordbury, 1970, B. Ing. **21**: Buckingham Palace Garden, 1996, P.C. Holland; plus two partly localized sites in **16** and one in **17**. TQ 06, 17, 27, 46, 48, 49; TL 10, 31. On leaf litter, especially of sycamore and mainly in winter; uncommon.

Trichiaceae

Hyporhamma abietina (Wigand) Lado [*Hemitrichia abietina* (Wigand) G. Lister]
21: Gunnersbury Triangle, 1983, B.M. Spooner. TQ 17. On trunk of living tree; rare. A rare species on the bark of living trees, scattered across Britain and Europe.

H. calyculata (Speg.) Lado [*H. calyculata* (Speg.) M.L. Farr]
16–18,20. 16 sites. Map 37. On fallen trunks, especially of beech; frequent. This is part of the *H. clavata* complex and is far commoner than *H. clavata sensu stricto* in most of the country.

H. clavata *sensu lato*
16–18, 20, 21. 32 sites. Map 38. On dead wood; frequent. Until recently this taxon was not split so the older records cannot be attributed to a segregate. The list includes undifferentiated records plus those of *H. clavata sensu stricto* and *H. calyculata*.

H. clavata (Pers.) Lado *sensu stricto* [*H. clavata* (Pers.) Rostaf.]
16–18, 20, 21. 14 sites. Map 39. On rotten wood; uncommon.

H. leiotricha (Lister) Lado [*H. leiotricha* (Lister) G. Lister]
18: Epping Forest and Wanstead Park (Lister 1918); Loughton Warren (Ross 1941).
21: Stanmore Common, 1929, C.A. Cooper. TQ 19, 48, 49. On dead stems of heather and other acidic plant remains; uncommon.

H. minor (G. Lister) Lado [*H. minor* G. Lister]
16: Petts Wood, 1976, B. Ing; Downe, 1980, I. Palmer; Shoreham, 1976, D.W. Mitchell, **17**: Esher Common, 2001, B. Ing; Royal Botanic Gardens, Kew, 2001, D.W. Mitchell. **19**: Epping Plain, 1971, B. Ing. **20**: Northaw Great Wood, 1967, B. Ing. **21**: Perivale Wood, 1988, A. Henrici; plus one partly localized site in **16**. TQ 16, 17, 18, 46, 56, 57; TL 20, 40. On bark of living trees and on fallen logs, often associated with liverworts; uncommon.

****H. pardina*** (Minakata) Lado [*H. pardina* (Minkata) Ing]
17: Woburn Park (Alexander 1923); Mickleham 1992, A. Henrici; Royal Botanic Gardens, Kew, 2003, B. Ing. **21**: Wormwood Scrubs, 1999, B. Ing. TQ 06, 15, 17, 28.
On bark of living trees; rare. Widespread but uncommon in Britain and Europe; not always separated from *H. minor*, of which it was previously treated as a variety.

Metatrichia floriformis (Schwein.) Nann.-Bremek. [*Trichia floriformis* (Schwein.) G. Lister]
16–18, 20, 21, 24. 61 sites. Map 40. On rotten wood in secondary woodland; rare a century ago but now very common.

M. vesparium (Batsch) Nann.-Bremek. [*Hemitrichia vesparium* (Batsch) T. Macbr.]
16–18, 20, 21, 24. 20 sites. Map 41. On fallen trunks of elm and beech; frequent.

Oligonema schweinitzii (Berk.) G.W. Martin
16: Joydens Wood, 1926, St J. Marriott; Petts Wood, 1976, B. Ing. **17**: Royal Botanic Gardens, Kew (Massee 1906); Woburn Park (Alexander 1923); Tandridge, 1904, A. Fry; West Humble. 1965, J.B. Hall. **18**: Cuckoo Pits, Chingford, 1942, D.J. Scourfield; Wake Valley Pond, 1947, P.K.C. Austwick. **20**: Cassiobury Reserve, 1969, B. Ing. TQ 06, 09, 15, 17, 35, 39, 46, 49, 57. On sticks on mud in dried-up ponds; uncommon; last seen in the London Area in 1976.

Prototrichia metallica (Berk.) Massee
17: Royal Botanic Gardens, Kew (Massee 1906); Woburn Park (Alexander 1923); Box Hill, 1969, P.C. Holland; Esher Common, 1999, B.M. Spooner. **20**: Potterscrouch Plantation, 1970, B. Ing; Box Wood, 1995, K. Robinson. **21**: Perivale Wood, 1995, A. Henrici. TQ 06, 15, 16, 17, 18; TL 10, 30. On twigs on the forest floor, especially in winter; uncommon.

Trichia affinis de Bary
16–21, 24. 39 sites. Map 42. On very rotten, damp mossy wood; common.

T. alpina (R.E. Fr.) Meylan
17: Weybridge, 1922, P.J. Alexander. TQ 06. On branch of *Prunus laurocerasus* in frozen ditch. This remains the only British record of a common alpine species; its presence in Surrey is still a mystery.

T. botrytis (J.F. Gmel.) Pers.
16–21, 24. 65 sites. Map 43. On fallen branches and logs, especially of oak or conifer; common. The var. *cerifera* G. Lister has been found in Epping Forest.

T. contorta (Ditm.) Rostaf.
16–18, 20, 21. 26 sites. Map 44. On sticks, leaf and stem litter and bark; frequent. The var. *inconspicua* (Rostaf.) Lister is found frequently with the typical form; the var. *iowensis* (T. Macbr.) Torrend was recorded in 1925 in the Abbey Woods and the var. *karstenii* (Rostaf.) Ing has also been found at Abbey Wood and Weybridge and near Sandridge.

T. decipiens (Pers.) T. Macbr.
16–21, 24. 71 sites. Map 45. On fallen wood of all kinds; common. Some records may refer to *T. meylanii*, which has only recently been separated.

T. favoginea (Batsch) Pers.
21: Highgate (Massee 1892). TQ 28. On dead wood; rare. This is the true species which has been combined with *T. affinis* and *T. persimilis*, incorrectly in the opinion of European workers, by most American specialists.

T. flavicoma (Lister) Ing [*botrytis* var. *flavicoma* Lister]
16: Chislehurst, 1976, B. Ing. **17**: Woburn Park (Alexander 1923): Limpsfield Common (Ross 1939). **18**: Loughton Forest (Lister 1918). **20**: Chorleywood Common, 1962, B. Ing; Kings Langley, 1978, B. Ing. **21**: Buckingham Palace Garden, 1998, A. Henrici. TQ 06, 09, 27, 45, 47, 49; TL 00. On leaf litter; uncommon.

T. lutescens (Lister) Lister
17: Woburn Park (Alexander 1923). **20**: Gobions Wood, 1993, K. Robinson.
TQ 06; TL 20. On bark in damp woodland; rare.

****T. meylanii*** Ing [*decipiens* var. *olivacea* Meylan]
16: Shoreham, 1966, P.C. Holland. **17**: Brooklands, 1962, B. Ing; Chipstead, Woldingham and Norbury Park, 1965, P.C. Holland; Royal Botanic Gardens, Kew, 2000, A. Henrici. **20**: Hertford, 1974, P.C. Holland; Whippendell Wood, 1978, P.C. Holland. **21**: Enfield, 1966, P.C. Holland. TQ 06, 09, 15, 17, 25, 35, 39, 56; TL 30. On dead wood; frequent, undoubtedly under-recorded. Widespread and not uncommon in Britain and Europe.

****T. munda*** (Lister) Meylan [*botrytis* var. *munda* Lister]
16: Abbey Wood (Marriott 1926). **17**: Woburn Park (Alexander 1923); Wimbledon Common, 1961, B. Ing; Peckham Rye Common, 1998, B. Ing. **18**: Epping Forest (Lister 1918). **21**: Perivale Wood, 1989, A. Henrici; Clapton Common, 1998, B. Ing; plus one partly localized record from **16**. TQ 06, 18, 27, 37, 38, 46, 47, 49. On moss on the bark of living trees; frequent. Scattered across the moister parts of the British Isles and Europe.

T. persimilis P. Karsten
16–21. 61sites. Map 46. Common on slightly decomposed logs.

T. scabra Rostaf.
16–18, 20, 21. 38 sites. Map 47. Common on fallen logs, especially of beech or elm.

T. varia (Pers.) Pers.
16–21, 24. 94 sites. Map 48. Common on wet, rotten wood of all kinds.

T. verrucosa Berk.
16: Abbey Wood (Marriott 1926). **17**: Woburn Park and Oxshott (Alexander 1923); Box Hill. 1961, B. Ing. **18**: Epping Forest (Lister 1918). **20**: Hoddesdon Park Wood, 1959, T.D.V. Swinscow. TQ 06, 15, 16, 47, 49; TL 30. On damp conifer wood; uncommon.

Stemonitales

Stemonitidaceae

Brefeldia maxima (Fr.) Rostaf.
16–18, 20, 21, 24. 21 sites. Map 49. Frequent on and around stumps.

Collaria arcyrionema (Rostaf.) Nann.-Bremek. [*Lamproderma arcyrionema* Rostaf.]
18: Epping Forest, 1892, A. Lister; Chingford, 1918, G. Lister. **21**: Highgate Woods, 1911, W. Hurst. TQ 28, 38, 39. On stumps; rare.

C. elegans (Racib.) Dhillon & Nann.-Bremek. [*Comatricha elegans* (Racib.) G. Lister]
17: Woburn Park (Alexander 1923); Royal Botanic Gardens, Kew, 1925, V.Wiltshire; Box Hill, 1960, B. Ing; Bookham Common, 1961, B. Ing; Oxshott, 1963, B. Ing; Mickleham, 1992, A. Henrici. **18**: Epping Forest, 1935, J. Ross; Knighton Wood, 1960, B. Ing. **19**: Lower Epping Forest (Lister 1918). **20**: Wormley Wood, 1961, B. Ing. TQ 06, 15, 16, 17, 49; TL 30, 40. On small, fallen conifer branches; frequent.

****C. lurida*** (Lister) Nann.-Bremek. [*Comatricha lurida* Lister]
17: Woburn Park (Alexander 1923); Reigate (Lister 1911.) TQ 06,25. On holly and ivy leaf litter; rare. A rare species scattered through southern Britain and also rare in Europe.

C. rubens (Lister) Nann.-Bremek. [*Comatricha rubens* Lister]
18: Walthamstow Forest (Lister 1897); Wanstead Park (Lister 1918); Loughton Warren, 1935, J. Ross. TQ 39, 48, 49. On holly leaf litter; rare.

Colloderma oculatum (Lippert) G. Lister

17: Oxshott, 1922, G. Lister; Woburn Park (Alexander 1923); Limpsfield Common (Ross 1939). **18**: Chingford and Debden Green (Lister 1913); Hainault, Lords Bushes and Gilbert Slade (Lister 1915); Amesbury Banks, 1939, J. Ross. **21**: Perivale Wood, 1988, A. Henrici. TQ 06, 16, 18, 38, 39, 45, 49; TL 40. On wet logs covered with films of cyanobacteria and on damp, mossy bark of living trees; uncommon.

****C. robustum*** Meylan

21: Ruislip Lido Nature Reserve, 1979, M.A. Sherwood. TQ 09. On fallen bark; rare. A globally rare species known in Britain also from Devon, Kent and Somerset and elsewhere from Switzerland, Hungary and Australia.

Comatricha alta Preuss

16–18, 20, 21. 17 sites. Map 50. On fallen trunks and stumps; frequent.

****C. ellae*** Harkonen

17: Putney Heath, 2000, B. Ing; Kingston Vale, 2000, B. Ing.

21: Buckingham Palace Garden, 1997, B. Ing. TQ 27. On the bark of living trees; rare. Scattered through Britain and Europe, but never common.

C. laxa Rostaf.

16–18, 20, 21. 26 sites. Map 51. On fallen branches and the bark of living trees; frequent.

C. nigra (Pers.) Schroet.

16–21, 24. 143 sites. Map 52. Common on dead wood of all kinds, and also on the bark of living conifers.

C. pulchella (C. Bab.) Rostaf.

16–21. 30 sites. Map 53. Frequent on holly leaf litter and on dead fern fronds. The var. *fusca* Lister is scattered through the area in Essex, Kent and Surrey.

****C. rigidireta*** Nann.-Bremek.

16–18, 21. 25 sites. Map 54. On the acidic bark of living trees; frequent. This nationally rare species appears to be most common in central London. It is otherwise scattered across Britain and is rare in Europe.

C. tenerrima (M.A. Curtis) G. Lister

16: Ruxley Pits, 1962, B. Ing; Paines Farm (Mitchell 1977). **17**: Woburn Park (Alexander 1923); Box Hill, 1969, P.C. Holland; Oxshott, 1994, B.M. Spooner. **18**: Lords Bushes, 1939, W.D. Graddon. **21**: Perivale Wood, 1993, A. Henrici; Ruislip Woods, 1992, B. Ing. TQ 06, 08, 15, 16, 18, 46, 49, 56. On dead herbaceous stems, especially in wetlands.

Enerthenema papillatum (Pers.) Rostaf.

16–21, 24. 56 sites. Map 55. On fallen branches of oak and pine and on acidic bark of living trees, especially oak; common.

Lachnobolus ater (Alb.& Schwein.) Lado [*Amaurochaete atra* (Alb.& Schwein.) Rostaf.]

17: Woburn Park, Oxshott and Byfleet (Alexander 1923); Royal Botanic Gardens, Kew, 1972, G. Waterhouse; Limpsfield, 1972, P.C. Holland. **18**: Leytonstone, 1909, G. Lister; Brentwood, 1963, B. Ing. **19**: Latton Park, 1968, P.C. Holland. **20**: Potterscrouch Plantation, 1970, B. Ing. **21**: on floating planks in the Thames in London (Berkeley 1836). TQ 06, 16, 17, 27, 38, 45, 69; TL 10, 40. On newly felled conifer trunks, occasionally on worked, ?unseasoned wood; frequent.

****L. tubulinus*** (Alb. & Schwein.) Lado [*A. tubulina* (Alb. & Schwein.) T. Macbr.]

17: Oxshott, 1965, B. Ing. TQ 16. On recently felled conifer logs; rare. A rare species in Britain and Europe.

Lamproderma arcyrioides (Sommerf.) Rostaf.

16: Abbey Wood (Marriott 1925). **17**: Royal Botanic Gardens, Kew, 1925, V. Wiltshire; Wimbledon Common, 1967, B. Ing; Esher Common, 1999, B.M. Spooner. **18**: Epping Forest (Lister 1918); Wanstead Park (Saunders 1911); Loughton Warren (Ross 1941). **20**: Potterscrouch Plantation, 1971, B. Ing. **21**: Ken Wood, 1888, M.C. Cooke. TQ 06, 16, 17, 27, 28, 47, 48, 49; TL 10. On leaf litter, especially of ivy; uncommon.

****L. columbinum*** (Pers.) Rostaf.

21: Hadley Woods (Hilton 1919); near Finchley (Hilton 1920). TQ 39. On mossy stumps; rare. In Britain this is a frequent species in western woodland, becoming rare eastwards. It is generally common in Europe, always associated with mosses.

****L. echinulatum*** (Berk.) Rostaf.

17: Royal Botanic Gardens, Kew, 2003, A. Henrici. TQ 17. On conifer stump; rare. Uncommon across the British Isles and more or less confined to coniferous forests in Europe.

L. scintillans (Berk. & Br.) Morgan
16–21. 39 sites. Map 56. Common on leaf litter, especially of holly and beech.

****Macbrideola cornea*** (G. Lister & Cran) Alexop.
17: Royal Botanic Gardens, Kew, 2001, D.W. Mitchell. TQ 17. On mosses on the bark of living plane trees; rare. Widespread and common in the moister, western half of the British Isles and common in Europe in damp, mountain valleys.

****M. macrospora*** (Nann.-Bremek.) Ing
17: Royal Botanic Gardens, Kew, 2003, B. Ing. TQ 17. On bark of living trees; rare. Generally rare, but widespread, in the British Isles and rare in Europe.

****Paradiacheopsis cribrata*** Nann.-Bremek.
16–18, 21. 34 sites. Map 57. Common on acidic bark of living trees. Widespread and generally common in the British Isles, less so in Europe.

P. fimbriata (G. Lister & Cran) Hertel [*Comatricha fimbriata* G. Lister & Cran]
16–21, 24. 113 sites. Map 58. One of the commonest bark myxomycetes and abundant in the area; rarely found on bramble stems, as in the type material.

****P. microcarpa*** (Meylan) D.W. Mitchell
17: Royal Botanic Gardens, Kew, 2000, B. Ing. **21**: Buckingham Palace Garden, 1997, B. Ing; Clissold Park, 1998, B. Ing; Victoria Park, 1998, B. Ing. TQ 17,27,38.
On the acidic bark of living trees, especially conifers and oak; rare. A generally rare species in the British Isles and Europe.

****P. rigida*** (Brandza) Nann.-Bremek.
17: Royal Botanic Gardens, Kew, 2003, B. Ing. TQ 17. On the bark of living trees; rare. Far less common than the other species of the genus in the London area, this species is also rare in the rest of Britain and Europe. It tends to favour less acid bark than the other species.

****P. solitaria*** (Nann.-Bremek.) Nann.-Bremek.
16–18, 20, 21. 32 sites. Map 59. On the bark of living trees; common. This species, which is common throughout the British Isles and Europe, is characteristic of ancient woodland. It is therefore surprising to find it in central London and supports the idea that many of the parks and commons are direct descendants of the ancient woodland cover.

Stemonaria longa (Peck) Nann.-Bremek. [*Comatricha longa* Peck]
17: Royal Botanic Gardens, Kew, 1938, R.W.G. Dennis. TQ 17. On rotting wood in a tropical house. This remains then only British record of a species usually found in warm temperate or tropical climates.

Stemonitis axifera (Bull.) T. Macbr.
16–21, 24. 36 sites. Map 60. On rotten wood; common.

S. flavogenita E. Jahn
16–18, 20, 21, 24. 22 sites. Map 61. On rotten wood; frequent.

****S. foliicola*** Ing
21: Copse Wood, Ruislip, 1963, B. Ing. TQ 09. On wet oak leaf litter; rare. This is the type locality — the material was cited as *S. trechispora* in the 1965 *Hand list*.

S. fusca Roth
16–21. 68 sites. Map 62. Common on rotten wood of all kinds.

S. herbatica Peck
16: Blackheath, 1906, E. Salmon; Abbey Wood (Marriott 1925); Ruxley Pits, 1964, B. Ing. **17**: Royal Botanic Gardens, Kew, 1968, D.M. Dring. **18**: Chingford (Ross 1918). **20**: Wormley Wood, 1966, T.D.V. Swinscow. **21**: Regent's Park (no details, **BM**). TQ 17,28,37,39,46,47; TL 30. Uncommon; on leaf litter.

****S. lignicola*** Nann.-Bremek.
18: Epping Forest (Lister 1918). TQ 48. On dead wood; rare. This species was recently separated from *S. herbatica* and differs in a few microscopic characters but is mainly differentiated on habitat.

S. nigrescens Rex
16: Joydens Wood, 920, St J. Marriott; Abbey Wood (Marriott 1925).
17: Royal Botanic Gardens, Kew, 2003, B. Ing. 18: Epping Forest, 1986, J. Holden.
TQ 17, 47, 49, 57. On bark of living trees and fallen bark, less often on fallen wood; uncommon.

S. smithii T. Macbr.
16: Ruxley Pit, 1962, B. Ing. 17: Coulsdon, 1966, P.C. Holland.
18: Walthanstow (Lister 1918.) TQ 35, 38, 46. On herbaceous litter in wetlands; rare.

****S. splendens*** Rostaf. var. ***webberi*** (Rex) Lister
17: Royal Botanic Gardens, Kew, 2002, A. Henrici. TQ 17. On rotten wood; rare. This is a predominantly tropical species and is only found in the mildest parts of the British Isles and Europe.

****S. virginiensis*** Rex
17: Bookham Common and Chipstead, 1965, P.C. Holland. **18**: Epping Forest, 1966, S. Carter. **20**: Bricket Wood, 1970, B. Ing. TQ 15, 25, 49; TL 10. On rotten wood; rare. Scattered throughout the British Isles and Europe but never common.

****Stemonitopsis amoena*** (Nann.-Bremek.) Nann.-Bremek.
16: Greenwich Park, 1998, B. Ing. **17**: Royal Botanic Gardens, Kew, 2003, B. Ing. TQ 17,37. On the bark of living trees; rare. An uncommon species throughout Britain and Europe.

S. hyperopta (Meylan) Nann.-Bremek. [*Stemonitis hyperopta* Meylan]
16: Abbey Wood (Marriott 1925). **17**: St Georges Hill and Reigate (Alexander 1923); Oxshott, 1967, P.C. Holland; Ockham Common, 1970, B. Ing. **18**: Chingford Forest, 1943, J. Ross. **20**: Bishops Wood, 1969, B. Ing; Sherrards Park Wood, 1970, B. Ing. TQ 05, 06, 09, 16, 25, 39, 47; TL 21. On rotten conifer wood; frequent.

S. microspora (Lister) Nann.-Bremek. [*S. microsperma* Ing]
17: Reigate (Alexander 1923). **21**: Wanstead Park, 1897, A. Lister. TQ 25, 48. On leaf litter; probably extinct in the British Isles.

S. typhina (F.H. Wigg.) Nann.-Bremek. [*Comatricha typhoides* (Bull.) Rostaf.]
16–21. 50 sites. Map 63. On wet, rotten logs, common.

****Symphytocarpus amaurochaetoides*** Nann.-Bremek.
17: Woburn Park (Alexander 1923). **18**: Epping Forest and Wanstead Park (Lister 1918); High Beach, 1925, G. Lister. **21**: Highgate Wood, 1963, B. Ing. **24**: Black Park, Iver, 1962, B. Ing. TQ 06, 08, 28, 48, 49. On hardwood stumps; uncommon. Scattered across Britain and Europe but not common.

S. flaccidus (Lister) Ing & Nann.-Bremek. [*Comatricha flaccida* (Lister) Morgan]
16–21. 22 sites. Map 64. On dead standing and fallen pine trunks; frequent.

****S. herbaticus*** Ing & Nann.-Bremek.
16: Abbey Wood (Marriott 1925.) **18**: Woodford, 1894, A. Lister. TQ 47, 49. On leaf litter; rare. Woodford is the type locality. Not recorded in mainland Europe.

S. impexus Ing & Nann.-Bremek. [*Stemonitis confluens* Cooke & Ellis in part]
17: Woburn Park (Alexander 1923); Esher Common, 1978, B.M. Spooner. **18**: High Beach, 1927, G. Lister; Chingford Forest (Lister 1928); Coxtie Green, 1961, P.K.C. Austwick; Navestock, 1973, P.C. Holland. TQ 06,16,39,49,59. On twiggy litter on the forest floor; uncommon.

PHYSARALES

Physaraceae

****Badhamia affinis*** Rostaf.
17: Royal Botanic Gardens, Kew, 1925, V. Wiltshire, 2001, B. Ing. TQ 17. On the bark of living trees; rare. A widespread species in western Britain and in moist valleys in Europe. One of several oceanic species now being found in the London area.

B. apiculospora (Harkonen) Eliasson & N. Lundqv. [*ovispora* auctt. non Racib.]
20: Bushey (Saunders 1911). TQ 19. On straw; probably extinct in Britain.

B. capsulifera (Bull.) Berk.
16: Bostall Heath, 1924, St J. Marriott. **17**: Weybridge and Kew (Massee 1892); Woburn Park (Alexander 1923); Bookham Common, 1977, P.C. Holland. **20**: Whippendell Wood, 1969, B. Ing; Broxbourne, 1995, K. Robinson. **21**: Isleworth (Saunders 1911); plus partly unlocalized records from **16** and **17**. TQ 06, 09, 15, 17, 35, 47, 56; TL 30. On bark of branches, less often trunks, of living trees; frequent.

B. foliicola Lister
16–18, 21. 21 sites. Map 65. On grasses in lawns and on bark of living trees; frequent.

B. macrocarpa (Ces.) Rostaf.
16: Bickley (Bevis and Griffin 1909); Sidcup, 1918, C.J. Sharpe. **17**: Woburn Park (Alexander 1923); Brooklands, 1963, B. Ing; Royal Botanic Gardens, Kew, 2002, B. Ing. **18**: Wanstead Park (Ross 1946); Loughton, 1924, G. Lister. **21**: Kensington Gardens, (Massee 1892); Shepperton, 1913, **BM**; Hampstead Heath, 2003, A. Wakefield. TQ 06,17,28,46,4748,49. On fallen branches and, occasionally, bark of living trees, frequent.

B. melanospora Speg. [*gracilis* (T. Macbr.) T. Macbr.]
17: Morden Hall, 1988, B. Ing. TQ 26. On fallen sycamore branch; rare. This species is characteristic of rotting cacti and succulents in tropical deserts and in the Mediterranean region. It is also found across Europe on dead wood. Perhaps more than one taxon is involved.

B. nitens Berk.
16: St Paul's Cray Common (Howse 1879). **17**: Woburn Park, 1922, P. J. Alexander; Royal Botanic Gardens, Kew (Massee 1906); Bookham Common,1963, B. Ing. TQ 06,15,17. On bracket fungi and bark of living trees; rare; last seen in the London Area in 1963.

B. panicea (Fr.) Rostaf.
16–21. 38 sites. Map 66. On fallen logs, especially of beech and elm and, rarely, on the bark of living trees; common.

B. populina A.& G. Lister
17: Royal Botanic Gardens, Kew, 1900, G. Massee. **18**: Walthamstow, 1899, J. Lloyd; Wanstead Park and Leytonstone, 1902, G. Lister; Walthamstow Reservoir, 1924, G. Lister; Whipps Cross Hospital, 1913, G. Lister. TQ 17,38,48. On fallen poplar logs; last seen in 1924 and probably extinct in Britain.

B. utricularis (Bull.) Berk.
16–21. 46 sites. Map 67. On *Stereum* and *Phlebia* and other fungi on fallen trunks; common.

Craterium aureum (Schum.) Rostaf.
16: Downe, 1964, B. Ing. **17**: Royal Botanic Gardens, Kew (Massee 1892); Woburn Park (Alexander 1923). **18**: High Beach (Hibbert-Ware 1918); Chingford, 1915, J. Ross; Theydon Forest, 1930, J. Ross. TQ 06,17,39,46,49. On leaf litter, especially of beech; uncommon.

C. brunneum Nann.-Bremek. [*concinnum sensu auctt. europ.*]
19: Wake Arms, Epping Forest (Holland 1974). **21**: Mad Bess Wood, Ruislip, 1968, M. Holden. TQ 08,49. On oak leaf litter; rare. These are the only British records of a species which is rare in Europe, mostly on oak or sweet chestnut litter.

C. dictyosporum (Rostaf.) Neubert, Nowotny & Baumann [*Badhamia obovata* (Peck) S. J. Smith in part]
18: Waltham Forest (Lister 1897); Chingford Forest, 1941, J. Ross. **20**: Cassiobury Park, 1897, G. Massee. TQ 09, 39. On bracken litter; rare.

C. leucocephalum (Pers.) Ditm.
16–21. 16 sites. Map 68. On leaf litter; frequent.

C. minutum (Leers) Fr.
16–21, 24. 59 sites. Map 69. On herbaceous litter; common.

Fuligo candida Pers. [*septica* var. *candida* (Pers.) R.E. Fr.]
16: one partly localized site. **17**: Woburn Park (Alexander 1923); Royal Botanic Gardens, Kew, 1951, P.K.C. Austwick; Box Hill, 1964, S.S. Bates. **18**: High Beach (Lister 1915). **19**: Wintry Wood, 1982, P.C. Holland. TQ 06, 15, 17, 49, 56; TL 40. On woody forest litter; rare.

F. cinerea (Schwein.) Morgan
17: Woburn Park (Alexander 1923). **18**: Theydon Bois (Lister 1918). **24**: Black Park, Iver, 1962, B. Ing. TQ 06, 08, 49. On straw piles and stable litter, not seen for forty years in Britain and probably extinct.

F. gyrosa (Rostaf.) E. Jahn [*Physarum gyrosum* Rostaf.]
17: Royal Botanic Gardens, Kew, a few records up to 1974. TQ 17. On litter in heated greenhouses; rare.

F. intermedia T. Macbr.
18: Epping Forest (Lister 1918); Loughton Forest (Lister 1937). TQ 49. On leaf litter; rare.

F. megaspora Sturgis
17: Kew, 1965, D. Reid. TQ 17. On litter of *Quercus ilex*; rare. This is the only British record of a species which is otherwise known from Mediterranean Europe and the tropics.

F. muscorum Alb. & Schwein.
16: Joydens Wood, 1926, W.T. Elliott. **18**: Epping Forest, 1909, G. Lister. **20**: Sherrards Park Wood, 1910, C. Higgins. TQ 49; TL 21. On terrestrial mosses and wet leaf litter; rare in eastern England, very much an Atlantic species.

F. rufa Pers. [*septica* var. *rufa* (Pers.) R.E. Fr.]
17: Woburn Park (Alexander 1923); Clapham, 1988, P.C. Holland; East Sheen Common, 1996, A. Henrici. **18**: Epping Forest (Lister 1918); Loughton, 1970, B. Ing; Leytonstone, 1997, A. Lister; Stubbers, 1981, P.C. Holland; Goldings Hill, 1985, J. Holden. **20**: Whippendell Wood, 1998, K. Robinson. **21**: Buckingham Palace Garden, 1996, P.C. Holland. TQ 06, 09, 17, 27, 37, 38, 49. On exposed, often hot, stumps; uncommon.

F. septica (L.) F.H. Wigg.
16–21, 24. 83 sites. Map 70. On fallen trunks, branches and stumps; common. Most records are of var. *flava* (Pers.) Lazaro Ibiza but var. *septica*, which has white as well as yellow pigments inside the aethalium, has been found once in each of Surrey, Essex and Hertfordshire.

Leocarpus fragilis (Dicks.) Rostaf.
16–21, 24. 63 sites. Map 71. On leaf litter, especially on conifer needles and gorse litter; common.

Physarum album (Bull.) Chevall [*nutans* Pers.]
16–21,24. 90 sites. Map 72. On dead wood of all kinds; common.

P. auriscalpium Cooke
18: Brentwood, 1963, B. Ing. **21**: Edmonton, 1984, P.C. Holland. TQ 39,69. On fallen branches and, outside the London area, the bark of living trees; rare.

P. bitectum G. Lister
17–21. 17 sites. Map 73. On bramble litter; frequent.

P. bivalve Pers.
16–21, 24. 41 sites. Map 74. On leaf litter; common.

P. cinereum (Batsch) Pers.
16–21. 37 sites. Map 75. On living grass, especially in lawns, and leaf litter; common.

****P. citrinum*** Schumach.
20: Sherrards Wood, 1894, J. Saunders. TL 21. On terrestrial mosses; rare. The species is rare in Britain, then mainly in the west and north and is very uncommon across Europe.

P. compressum Alb. & Schwein.
16–21. 23 sites. Map 76. On herbaceous litter and, rarely, on bark of living trees; frequent.

****P. conglomeratum*** (Fr.) Rostaf.
16: Darenth Wood, **BM**. **21**: Enfield, **K**, TQ 39. On damp leaf litter; rare. These were earlier recorded as *P. contextum*. Rare in Britain and Europe.

P. contextum (Pers.) Pers.
17: Royal Botanic Gardens, Kew (Massee 1892). **18**: Warren Hill, 1938, J. Ross. **20**: Bushey, 1901, A. Hibbert-Ware. TQ 17,19,49. On damp leaf litter; rare.

P. crateriforme Petch
17: St George's Hill, Weybridge (Alexander 1923): Esher Common, 2001, B. Ing; Royal Botanic Gardens, Kew, 2001, B. Ing. TQ 06, 16, 17. On fallen branches and bark of living trees; uncommon.

P. decipiens M.A. Curtis
19: Jack's Hatch, 1967, P. C. Holland. TL 40. On fallen branches and bark of living trees; rare. In the British Isles this is a distinctly western species and in mainland Europe it is more common in damp valleys in the mountains.

P. didermoides (Pers.) Rostaf.
16: Greenwich Park (Currey 1857). **17**: Woburn Park (Alexander 1923). TQ 06,37. On straw heaps; rare — much diminished in Britain with the loss of its habitat.

****P. echinosporum*** Lister
17: Royal Botanic Gardens, Kew (Dennis 1948). TQ 17. On pots of germinating seed imported from Kenya — the only European record of this tropical species.

****P. galbeum*** Wingate
17: Woburn Park (Alexander 1923). TQ 06. On dead bramble stems; rare. This species is decidedly uncommon and confined to the southern half of England and the warmer parts of Europe.

P. globuliferum (Bull.) Pers.
17: St George's Hill, Weybridge (Alexander 1923). TQ 06. On fallen branches; rare.

P. leucophaeum Fr.
16–21, 24. 45 sites. Map 77. On fallen branches and trunks; common.

P. leucopus Link
17: Royal Botanic Gardens, Kew (Massee 1906). **19**: Wake Arms area, 1968, B. Ing. **20**: Panshanger Park, 1991, K. Robinson. **21**: Highgate, 1888, M.C. Cooke; Mad Bess Wood, 1968, B. Ing. TQ 08, 17, 28, 49; TL 21. On leaf litter; uncommon.

P. notabile T. Macbr.
17: South Hawke, 1963, B. Ing. **20**: Potterscrouch Plantation, 1970, B. Ing; Chipperfield Common, 1971, D. Graham. TQ 35; TL 00, 10. On rotten branches; rare.

P. nucleatum Rex
16: Abbey Wood (Lister 1926). TQ 47. On rotten wood; rare.

****P. nudum*** T. Macbr.
17: Royal Botanic Gardens, Kew, 2000, A. Henrici. TQ 17. On leaf litter; rare. This is only the third British record of a widely distributed European species, although it is never common.

****P. obscurum*** (Lister) Ing
17: Royal Botanic Gardens, Kew, 1927, V. Wiltshire. **18**: Epping Forest, 1939, J. Ross. TQ 17, 49. On leaf litter; rare. Scattered throughout the British Isles and Europe but always uncommon.

P. ovisporum G. Lister
18: Chingford (Lister 1921). TQ 39. On leaf litter; rare.

P. psittacinum Ditmar
16: Abbey Wood (Marriott 1925). **17**: Bookham Common, 1967, P.C. Holland; Esher Common, 1994, B.M. Spooner. **18**: Loughton and Theydon forests (Lister 1937). **20**: Gobion Wood, 2003, P. Cullington; plus one partly localized record from **16**. TQ 15, 16, 46, 47, 49; TL 10. On stumps and fallen trunks in ancient woodland; uncommon.

P. pusillum (Berk. & M.A. Curt.) G. Lister
16: Farningham, 1925, St.J. Marriott. **17**: Woburn Park (Alexander 1923); Richmond Park, 1892, G. Lister; Royal Botanic Gardens, Kew, 1997, A. Henrici; Clapham Common, 1999, B. Ing. **18**: Loughton and Wanstead Park (Lister 1918). **21**: Perivale Wood, 1995, A. Henrici; Buckingham Palace Garden, 1996, P.C. Holland. TQ 06, 17, 18, 27, 48, 49, 56. On grass litter and the bark of living trees; uncommon.

P. robustum (Lister) Nann.-Bremek. [*nutans* var. *robustum* Lister]
16–18, 20, 21. 20 sites. Map 78. On rotten wood; frequent.

P. straminipes Lister
17: Royal Botanic Gardens, Kew, 1925, V. Wiltshire. **20**: near Welwyn, 1987, J. Saunders. **21**: Wood Green, 1911, C. Hurst. TQ 17, 29; TL 21. On straw heaps; rare, now extinct in many former areas, with the loss of its habitat.

P. vernum Sommerf.
17: Mickleham, 1923, J. Bloom; Woburn Park and Oxshott (Alexander 1923); Bookham Common, 1962, B. Ing. **18**: Walthamstow Forest (Lister 1897); Chigwell (Lister 1898); Epping Forest (Lister 1918); Wanstead (Saunders 1911); Chingford (Ross 1918). TQ 06, 15, 16, 39, 48, 49. On herbaceous litter; uncommon.

P. virescens Ditmar
16: Chislehurst (Massee 1892); Scords Wood, 1968, S. Carter. **17**: Princes Covert, 1907, W.J. Lucas; Ockham Common, 1970, B. Ing; Littleworth Common, 1965, P.C. Holland. **18**: Epping Forest (Lister 1918). **20**: Potterscrouch Plantation, 1970, B. Ing. **21**: Mad Bess Wood, 1968, S. Carter. **24**: Black Park, Iver, 1963, B. Ing. TQ 05, 08, 16, 47, 49; TL 10. On terrestrial mosses in damp woodland; uncommon.

P. viride (Bull.) Pers.
16–21, 24. 35 sites. Map 79. On rotten wood, especially conifer brashings; common. The varieties *aurantium* (Bull.) Lister and *incanum* Lister have been recorded in our area from 16, 17, 18, 21 and 18, 20, 21 respectively but are uncommon.

Didymiaceae

Diachea leucopodia (Bull.) Rostaf.
16–21. 15 sites. Map 80. On leaf litter and bramble stems; frequent.

****D. subsessilis*** Peck
20: Great Wood, Northaw, 1969, B. Ing. TL 20. On leaf litter; rare. An uncommon species throughout Britain, north to Perthshire, and not common in Europe.

Diderma asteroides (Lister & G. Lister) G. Lister
17: Woburn Park (Alexander 1923). TQ 06. On evergreen leaf litter; rare.

****D. chondrioderma*** (de Bary & Rostaf.) G. Lister
17: Royal Botanic Gardens, Kew, 2003, B. Ing. TQ 17. On the bark of living *Cercis siliquastrum*; rare. Another species of corticolous myxomycete which is far commoner in the west of the British Isles and in mountain valleys in Europe.

****D. cinereum*** Morgan
17: Mickleham, 1923, H. Bloom (as *D. globosum*). TQ 15. On terrestrial mosses and litter; rare. This is a rare species in Britain, with three sites, and is very uncommon in Europe.

D. deplanatum Fr.
16: Petts Wood and Chiselhurst (Howse 1879); Blackheath (Massee 1892); Abbey Wood (Marriott 1925). **17**: Woburn Park (Alexander 1923); Limpsfield Common (Ross 1939); Box Hill, 1965, P.C. Holland; West End Common, T. Laessoe. **18**: Epping Forest (Lister 1918). **20**: Northaw Great Wood, 1965, P.C. Holland. TQ 06, 15, 16, 37, 45, 46, 47, 49; TL 20. On terrestrial mosses and leaf litter; uncommon.

****D. donkii*** Nann.-Bremek.
16: Great Park Wood, 1980, D.W. Mitchell. **17**: Tandridge, 1970, P.C. Holland; Arbroook Common, 1999, B.M. Spooner. **18**: Thorndon Park, 1991, M.J. Gregory. **21**: Crouch End, 1992, S. Kelly. TQ 16, 28, 35, 46, 69. On damp leaf litter; uncommon. Widespread but uncommon in the British Isles and mainland Europe.

D. effusum (Schwein.) Morgan
16–18, 20, 21. 19 sites. Map 81. On leaf litter, especially that of beech; frequent.

D. floriforme (Bull.) Pers.
16–18, 20, 21. 20 sites. Map 82. On fallen trunks in damp, ancient woodland; frequent.

D. globosum Pers.
16: one partly localized record. **17**: Richmond, 1910, G. Lister; Oxshott, 1994, B.M. Spooner. **18**: Wanstead Park, 1894, A. Lister; Walthamstow, 1960 F.W. Evens. **20**: Whippendell Wood and Gobion Wood, 1992, K. Robinson; Brooklands Park, 1993, K. Robinson. 8 sites. TQ 09,16,17,38,46,48; TL 10,20. On living plants and litter in wetland habitats; uncommon.

D. hemisphaericum (Bull.) Hornem.
16–21, 24. 19 sites. Map 83. On litter in damp woodland; frequent.

D. montanum (Meylan) Meylan
17: Esher Common, 1980, B.M. Spooner. **18**: High Beach and Loughton, 1924, G. Lister; Chingford, 1941, J. Ross. **19**: Wake Arms area, 1968, B. Ing. **21**: Perivale Wood, 1962, B. Ing. **24**: Black Park, Iver, 1962, B. Ing. TQ 08,16,18,39,49. On leaf litter and mosses; rare.

D. simplex (Schroet.) G. Lister
18: Chingford, 1956, J. Ross TQ 39. On acidic leafy litter; rare.

D. spumarioides (Fr.) Fr.
16: Greenwich (Currey 1857). **17**: Woburn Park (Alexander 1923); Royal Botanic Gardens, Kew, 1925, V. Wiltshire; Mickleham, 1988, A. Henrici. **18**: Chingford (Lister 1923); Loughton Warren (Ross 1941). **20**: Bushey, 1901, A. Hibbert-Ware. **21**: Hampstead and Highgate (Massee 1892). TQ 06, 15, 17, 19, 28, 37, 39, 49. On leaf litter in dry calcareous habitats; uncommon.

D. testaceum (Schrader) Pers.
16: Abbey Wood and Darenth, 1926, St J. Marriott. **17**: Selsdon Wood, 1963, T.D.V. Swinscow. **20**: Sherrards Park Wood, 1985, K. Robinson. **21**: Perivale Wood and Copse Wood, Ruislip, 1963, B. Ing. TQ 08, 18, 36, 47, 57; TL 21. On leaf litter; rare.

D. umbilicatum Pers. [*radiatum* (L.) Morgan var. *umbilicatum* (Pers.) Meylan]
16: Abbey Wood (Marriott 1925). **17**: Ashtead and Esher, 1910, E. Step; Sheen Common, 1925, V. Wiltshire. **18**: Walthamstow Forest (Lister 1897); Cooks Folly, 1902, A. Lister; Cuckoo Pits Survey, LNHS; Epping Forest (Lister 1918); Loughton Warren (Ross 1941). **21**: Canons Park (Saunders 1911). TQ 15, 16, 17, 19, 39, 47, 49. On small, mossy branches and dead bramble stems; rare.

Didymium anellus Morgan
16: one partly localized record. **17**: Woburn Park (Alexander 1923); Limpsfield Common (Ross 1939). **18**: Loughton Warren (Ross 1941); Chingford and Wanstead Park, 1961, B. Ing. **21**: Northolt, 1912, G. Lister. TQ 06, 18, 39, 45,48, 49, 56. On leaf litter; uncommon.

D. bahiense Gottsberger [*iridis* (Ditm.) Fr. in part]
16–21. 25 sites. Map 84. On herbaceous litter; frequent.

D. clavus (Alb. & Schwein.) Rabenh.
16–21. 36 sites. Map 85. On leaf litter, rarely on bark of living trees; common.

****D. comatum*** (Lister) Nann.-Bremek. [*difforme* var. *comatum* Lister]
16: Abbey Wood, 1919, St J. Marriott. **18**: Epping Forest (Ross 1946). TQ 47, 49. On straw and grass litter; rare. Widespread but not always recorded separately from *D. difforme*.

****D. crassicolle*** Ing
18: Brentwood, 1963, B. Ing. TQ 69. On leaf litter; rare. Not yet known outside the British Isles, this species is part of the *D. iridis* complex.

D. crustaceum Fr.
17: Woburn Park (Alexander 1923). TQ 06. On leaf litter, especially in hedge bottoms; rare.

D. difforme (Pers.) Gray
16–21, 24. 69 sites. Map 86. On herbaceous litter of all kinds, rarely on bark of living trees; common.

****D. dubium*** Rostaf.
16: Scords Wood, 1978, D.W. Mitchell. TQ 45. On litter; rare. This is part of a difficult species-complex, some of whose members are alpine and others lowland; both sets of taxa are rare in Britain and the whole complex needs revision.

****D. eximium*** Peck emend. Nann.-Bremek. [*iridis* in part]
16: Lullingstone, 1980, A. Palmer. **17**: Oxshott, 1917, G. Lister; Royal Botanic Gardens, Kew, 1991, T. Laessoe. TQ 16, 17, 56. On herbaceous litter; uncommon. Widespread in Britain and Europe but never common.

****D. ilicinum*** Ing
17: Esher Common, 2000, B.M. Spooner; Royal Botanic Gardens, Kew, 2000, A. Henrici. **18**: Wanstead Park, 1896, G. Lister. **21**: Buckingham Palace Garden, 1995, P.C. Holland. TQ 16, 17, 27, 48. On leaf litter, especially of holly; frequent. This is a segregate from the common and variable, but asexual, *D. squamulosum*. Probably common in Britain and Europe but not adequately studied.

D. iridis (Ditm.) Fr. *sensu lato*
17: Woburn Park (Alexander 1923); Limpsfield Common (Ross 1939). TQ 06,45. On herbaceous litter; frequent. These records probably refer to *D. bahiense* but in the absence of specimens cannot be assigned.

D. laxifila G. Lister & Ross
16: Petts Wood, 1976, B. Ing. **17**: Wimbledon Common, 1967, B. Ing. **18**: Loughton Warren, 1935, J. Ross (TYPE); Woodford Wells, 1938, W.D. Graddon; Brentwood, 1963, B. Ing. **19**: Wake Arms area, 1968, B. Ing. **20**: Northaw Great Wood, 1967, B. Ing. **21**: Queen's Wood, Highgate Wood and Hampstead Heath, 1963, B. Ing; Holland Park, 1976, B. Ing. TQ 27, 28, 46, 49; TL 20. On deeply buried leaf litter, especially of sweet chestnut; frequent. This characteristic Mediterranean species, from coastal evergreen oak and Aleppo pine forest, is rare in Britain and absent from the rest of temperate Europe, but is not uncommon in the London Area, from where it was originally described!

D. listeri Massee
17: Woburn Park (Alexander 1923). **18**: Chingford (Lister 1928). TQ 06,39. On leaf litter; rare.

D. megalosporum Berk. & M.A. Curtis
17: Oxshott, 1967, P.C. Holland; Mickleham, 1994, A. Henrici. **18**: Wanstead Park, 1896, A. Lister. **20**: Chorleywood Common, 1963, J.B. Hall. **21**: Perivale Wood and Buckingham Palace Garden, 1998, A. Henrici; Gunnersbury Park, 2002, B. Ing. TQ 09, 15, 16, 17, 18, 27, 48. On herbaceous litter, dung and rotting bracket fungi; uncommon.

D. melanospermum (Pers.) T. Macbr.
16–18, 20, 21, 24. 31 sites. Map 87. On dead wood, conifer, gorse and oak litter; common.

D. minus (Lister) Morgan
16: Woburn Park (Alexander 1923); Oxshott, 1994, B. Ing. **18**: Epping Forest (Lister 1918). **20**: Batch Wood, St Albans, 1989, M. Holden. **21**: Monken Hadley Common, 1913, J. Smith; Stanmore Common, 1927, C. Cooper. TQ 06, 16, 19, 29, 49. On dead herbaceous stems, especially of rosebay; uncommon.

D. nigripes (Link) Fr.
16–21. 38 sites. Map 88. On leaf litter, especially of holly; common.

****D. ovoideum*** Nann.-Bremek.
17: Leatherhead, 1938, H.J. Burkill; Penge, 1963, B. Ing. **24**: Black Park, Iver, 1962, B. Ing. TQ 08, 15, 37. On leaf litter; uncommon. Widespread in Britain and Europe but never common.

D. serpula Fr.
17: Royal Botanic Gardens, Kew (Massee 1892); Wimbledon Common, 1967, P.C. Holland. **18**: Wanstead Park (Lister 1918); Brentwood, 1963, B. Ing. **19**: Wake Arms area, 1968, B. Ing. **20**: Chorleywood, 1969, B. Ing; Bricket Wood, 1995, K. Robinson. **21**: Wood Green and Winchmore Hill, 1911, J. Smith. **24**: Black Park, Iver, 1962, B. Ing. TQ 08, 09, 17, 27, 39, 48, 49; TL 10. On leaf litter; uncommon.

D. squamulosum (Alb. & Schwein.) Fr.
16–21, 24. 75 sites. Map 89. On leaf litter; common. This is a complex of related taxa and these records may refer to a number of different segregates.

D. sturgisii Hagelst. [incl. *Trabrooksia applanata* H.W. Keller]
17: Weybridge, 1922, P.J. Alexander. TQ 06. On fallen branch; rare. This was the first of very few British records; the species is frequent on bark of oak trees in southern Europe.

D. trachysporum G. Lister
17: Woburn Park and Reigate (Alexander 1923); Royal Botanic Gardens, Kew, 1925, V. Wiltshire. **18**: Leytonstone and Theydon Bois (Lister 1923). TQ 06, 17, 25, 38, 49. On straw and leaf litter, even on bulbs in water culture; rare.

****D. tubulatum*** E. Jahn [*difforme* var. *repandum* G. Lister]
17: Woburn Park, 1922, P. J. Alexander; Norbury Park, Hb. SLBI. TQ 06, 15. On straw and herbaceous litter; rare. Probably widespread but not always separated from *D. difforme*.

D. vaccinum (Dur. & Mont.) Buchet
17: Reigate and Woburn Park (Alexander 1923). **20**: Chorleywood, 1963, B. Ing. TQ 06, 09, 25. On straw and thatch; rare.

Lepidoderma chailletii Rostaf.
18: Chingford, 1942, J. Ross; Loughton Warren, 1935, J. Ross. TQ 39, 49. On acidic leaf litter; rare.

L. tigrinum (Schrader) Rostaf.
17: Royal Botanic Gardens, Kew (Massee 1906). TQ 17. On algae on rotten conifer logs; rare. This is a typical Atlantic species of wet mosses on rocks and soggy logs; it is unknown in eastern Britain at the present day.

Mucilago crustacea F.H. Wigg. [*spongiosa* (Leyss.) Morgan]
16–21. 30 sites. Map 90. On living grasses on calcareous soils; common.

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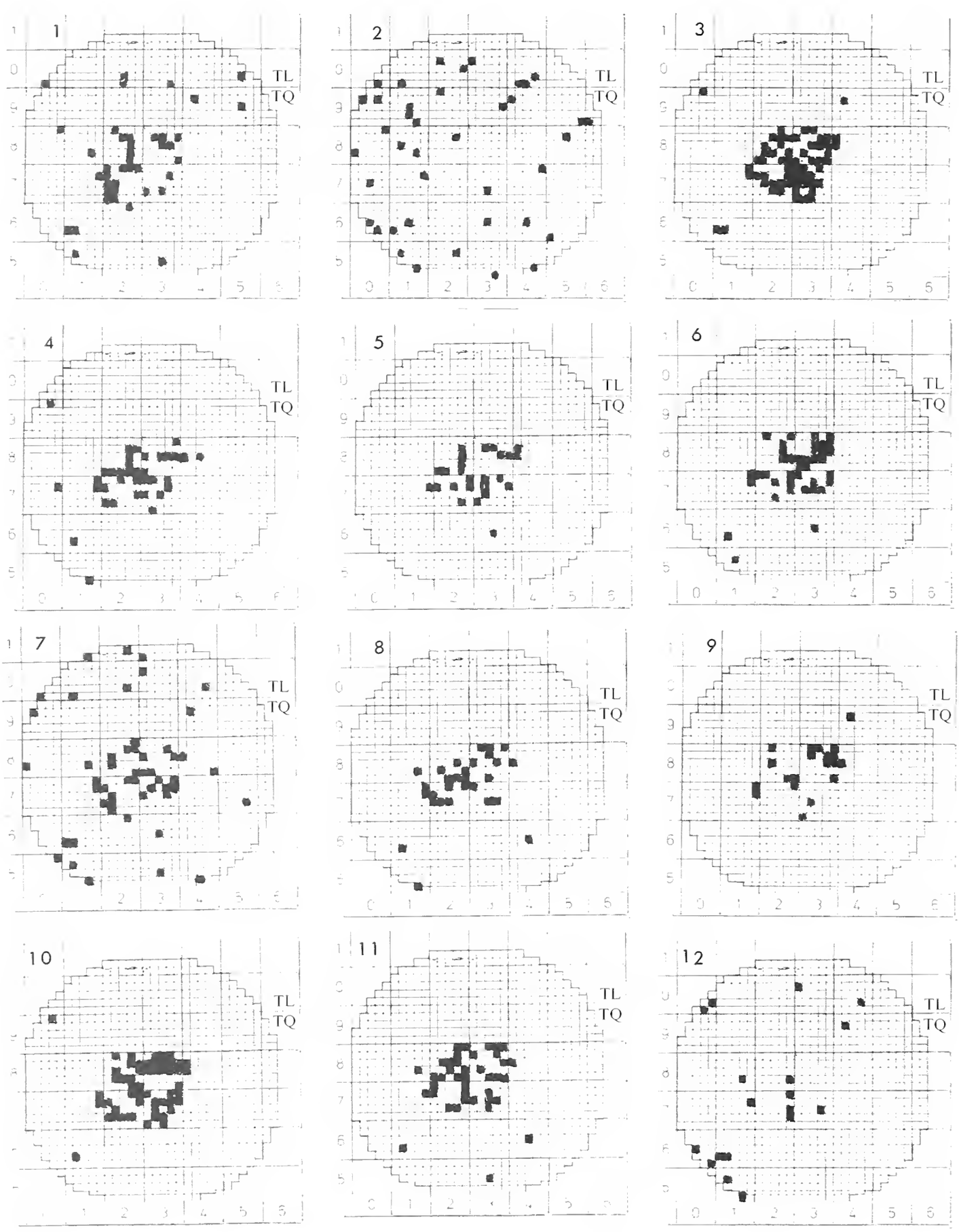
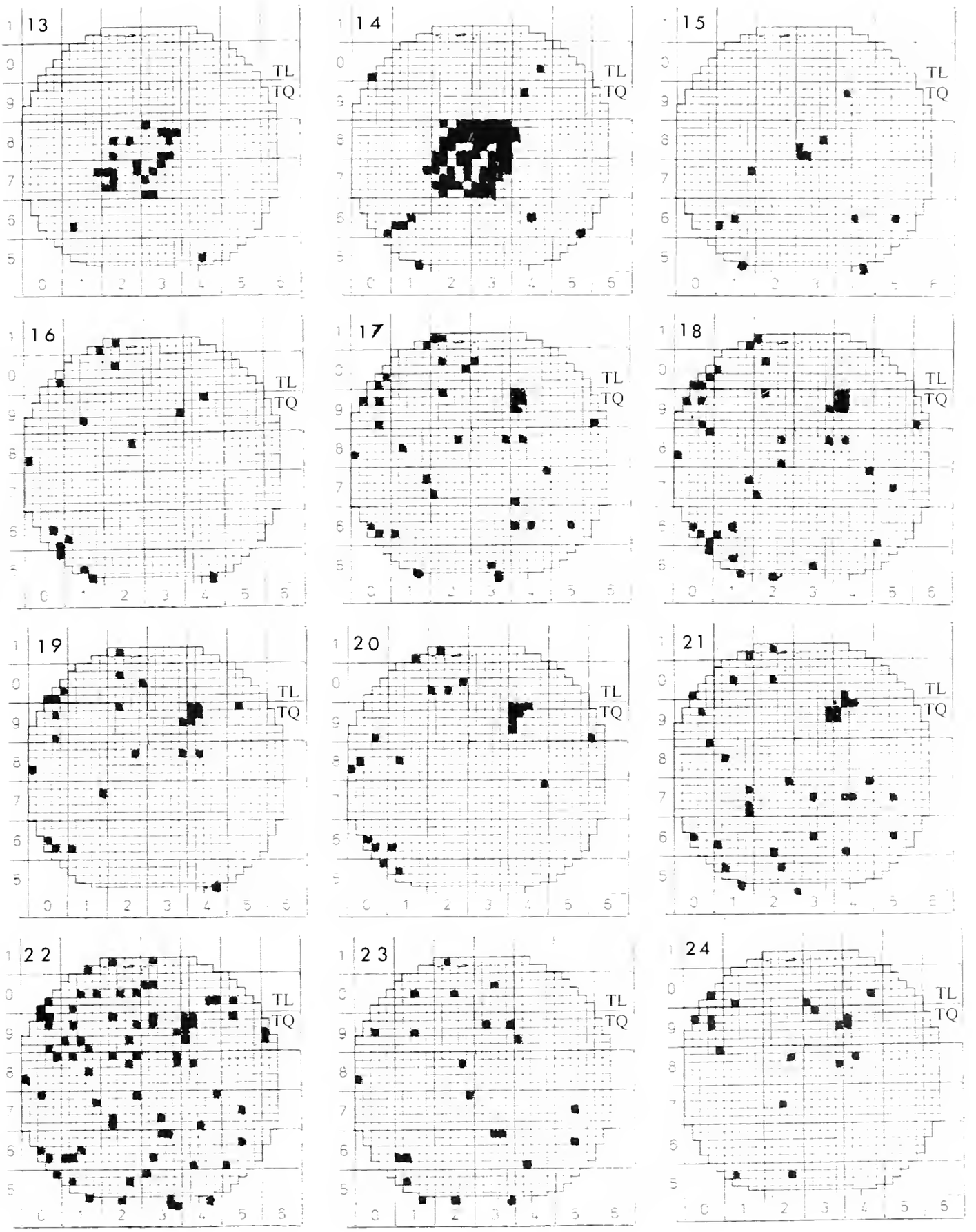
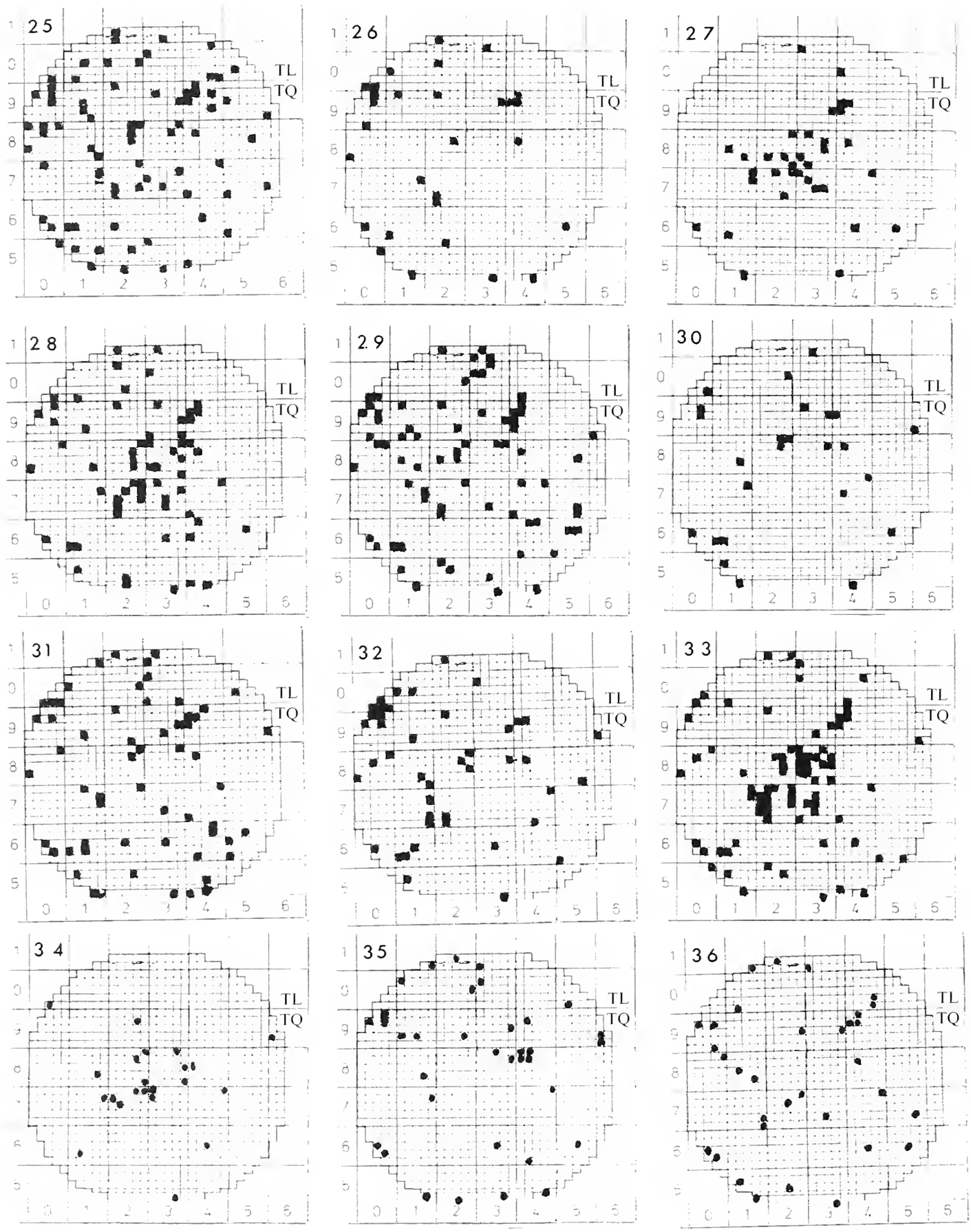
Maps 1–90 follow



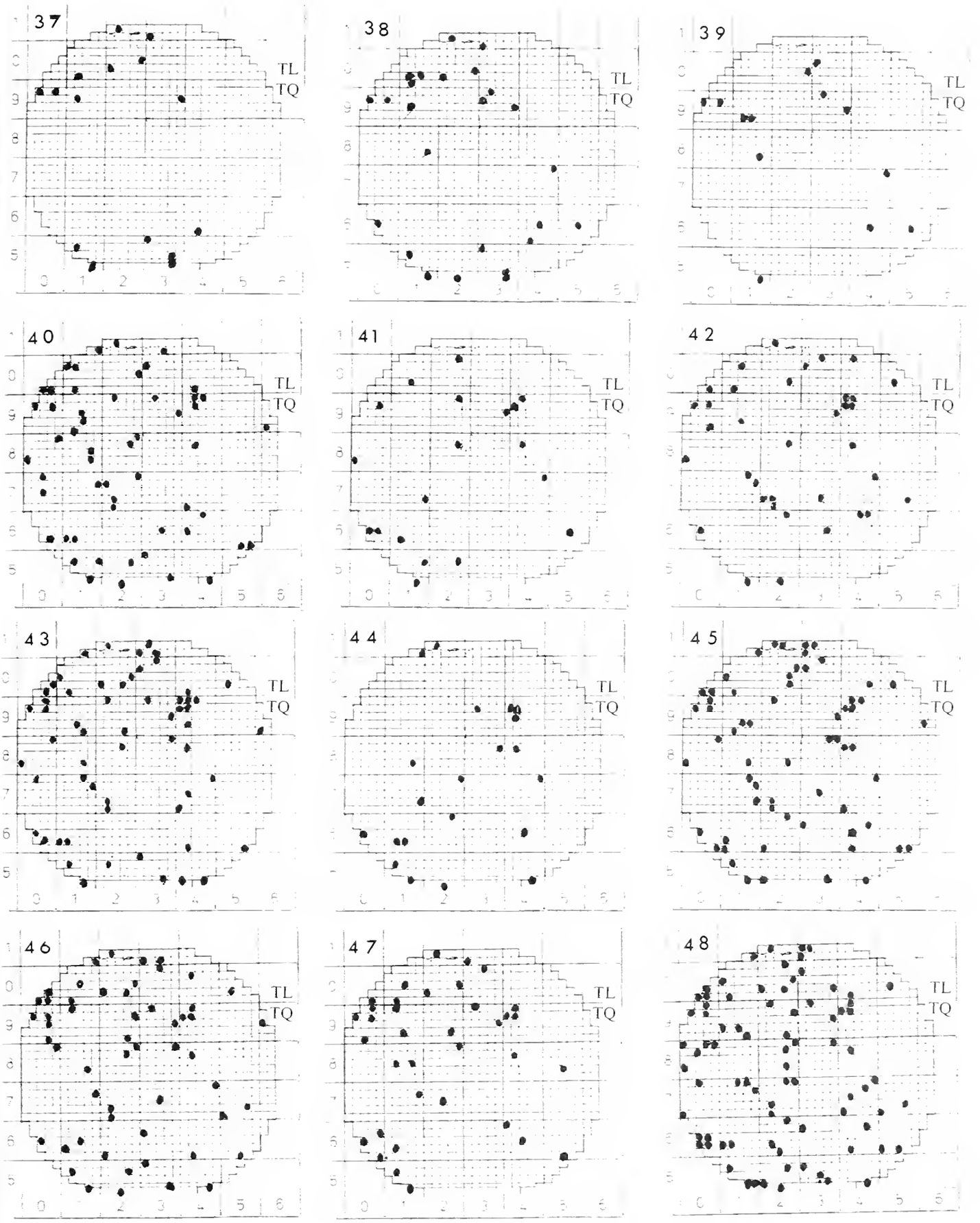
MAPS 1–12: 1 – *Pocheina rosea*. 2 – *Famintzinia fruticulosa*. 3 – *Echinostelium brooksii*. 4 – *Echinostelium colliculosum*. 5 – *Echinostelium corynophorum*. 6 – *Echinostelium fragile*. 7 – *Echinostelium minutum*. 8 – *Licea biforis*. 9 – *Licea denudescens*. 10 – *Licea kleistobolus*. 11 – *Licea marginata*. 12 – *Licea minima*.



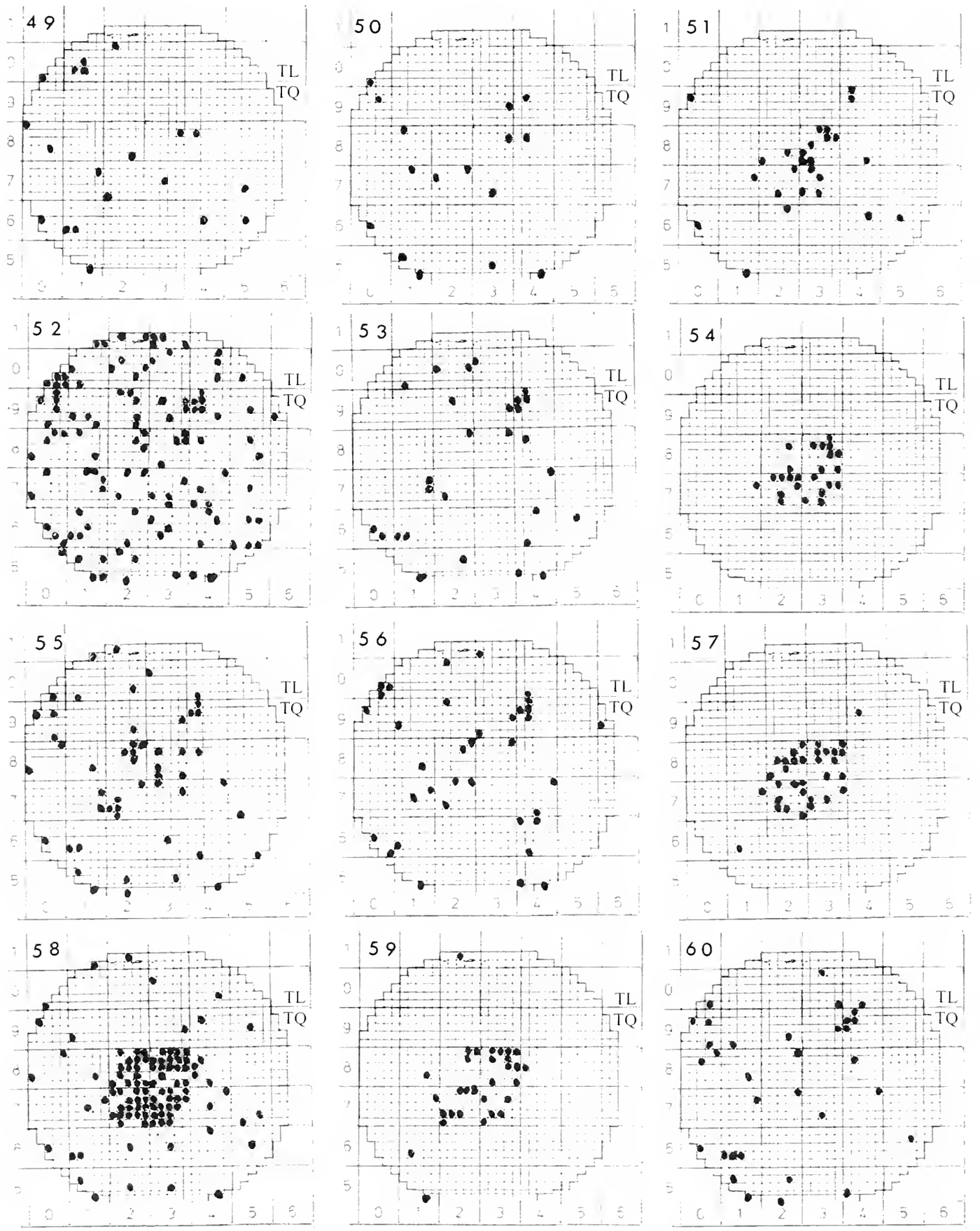
MAPS 13–24: 13 – *Licea operculata*. 14 – *Licea parasitica*. 15 – *Licea pusilla*. 16 – *Licea variabilis*. 17 – *Cribraria argillacea*. 18 – *Cribraria aurantiaca*. 19 – *Cribraria cancellata*. 20 – *Cribraria rufa*. 21 – *Dictydiaethalium plumbeum*. 22 – *Lycogala epidendrum* s.l. 23 – *Lycogala terrestre*. 24 – *Reticularia jurana*.



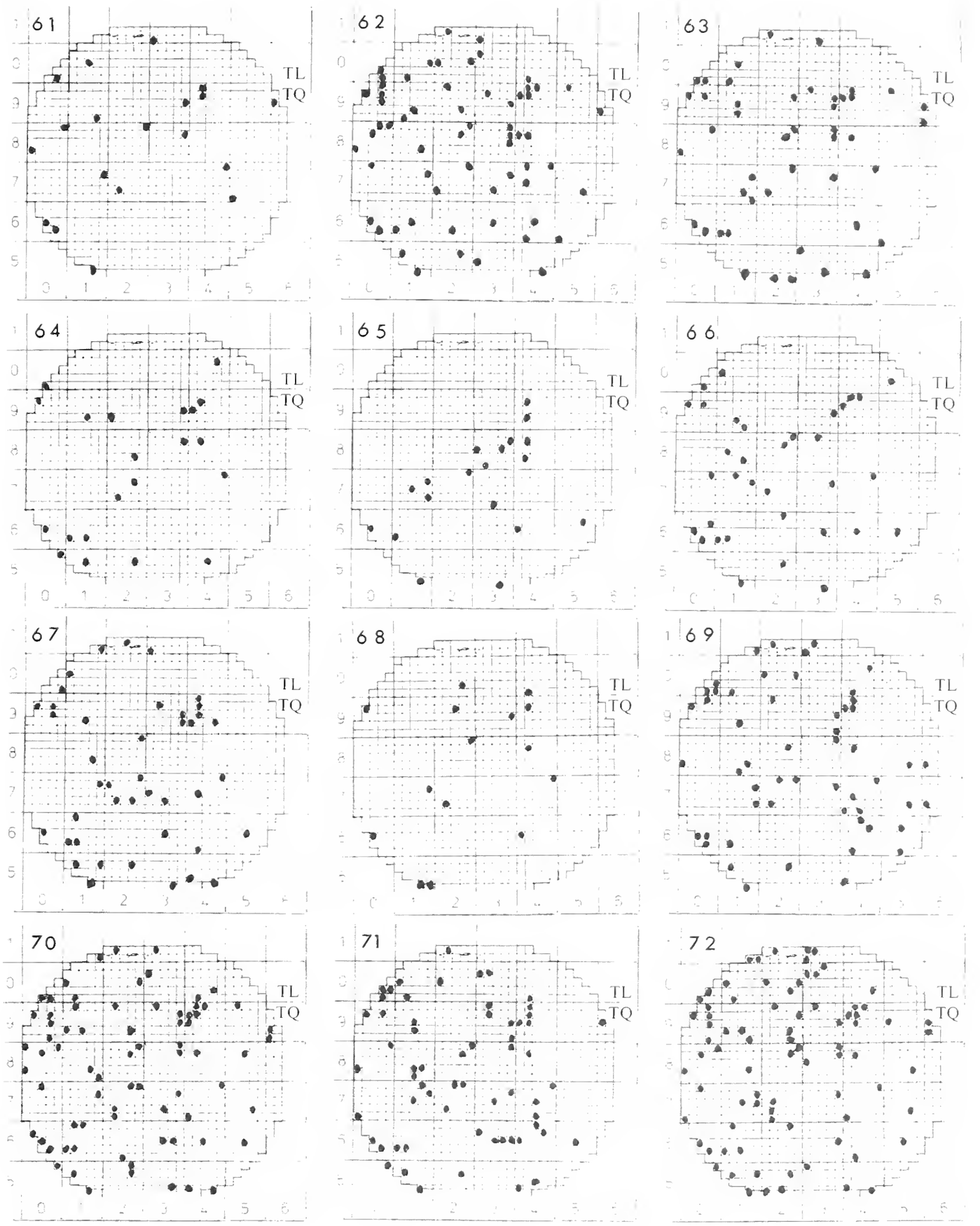
MAPS 25–36: 25 – *Reticularia lycoperdon*. 26 – *Tubulifera arachnoidea*. 27 – *Calomyxa metallica*. 28 – *Arcyria cinerea*. 29 – *Arcyria denudata*. 30 – *Arcyria ferruginea*. 31 – *Arcyria incarnata*. 32 – *Arcyria obvelata*. 33 – *Arcyria pomiformis*. 34 – *Perichaena chrysosperma*. 35 – *Perichaena corticalis*. 36 – *Perichaena depressa*.



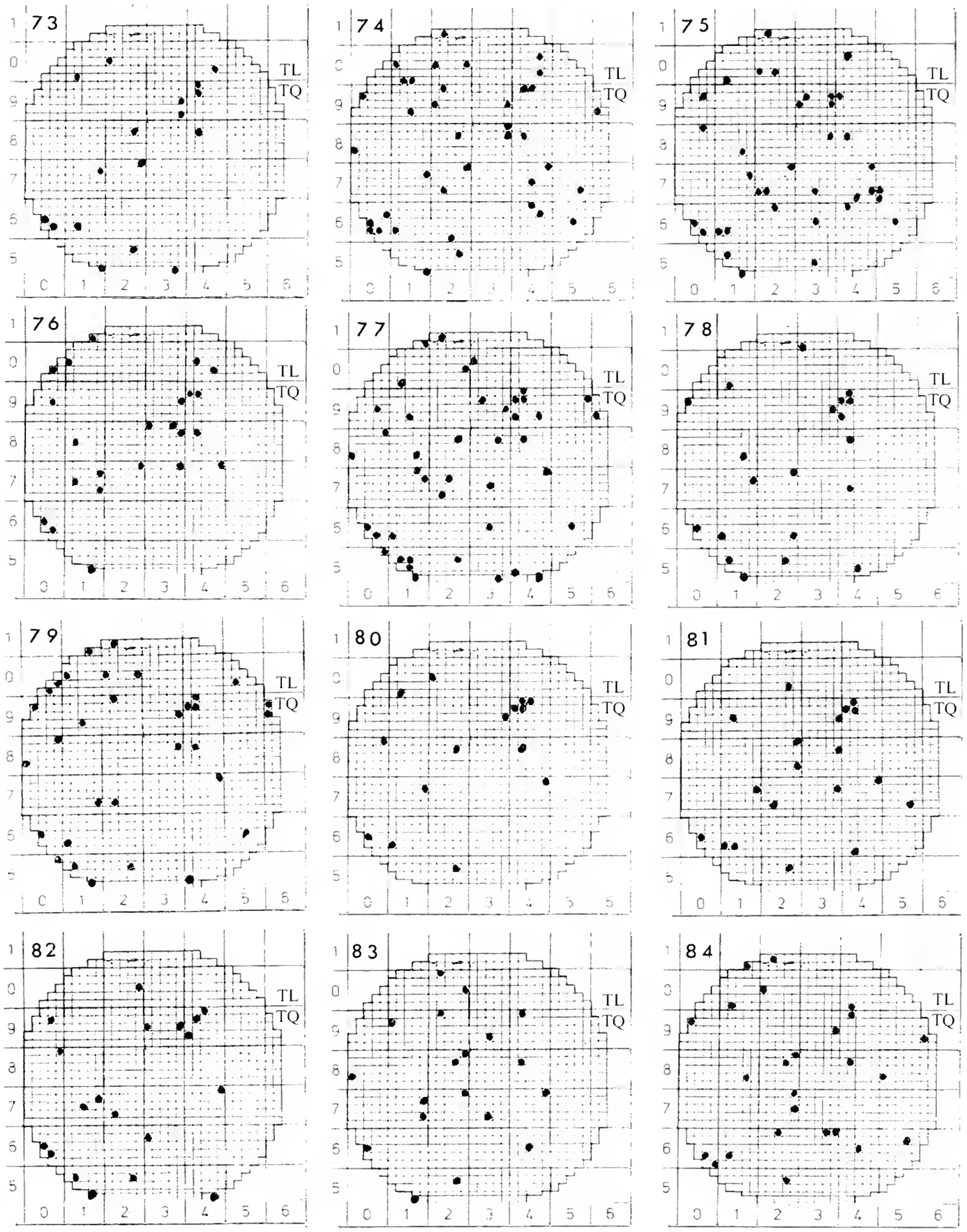
MAPS 37–48: 37 – *Hyporhamma calyculata.* 38 – *Hyporhamma clavata* s.l.
39 – *Hyporhamma clavata* s.s. 40 – *Metatrichia floriformis.* 41 – *Metatrichia vesparium.*
42 – *Trichia affinia.* 43 – *Trichia botrytis.* 44 – *Trichia contorta.* 45 – *Trichia decipiens.*
46 – *Trichia persimilis.* 47 – *Trichia scabra.* 48 – *Trichia varia.*



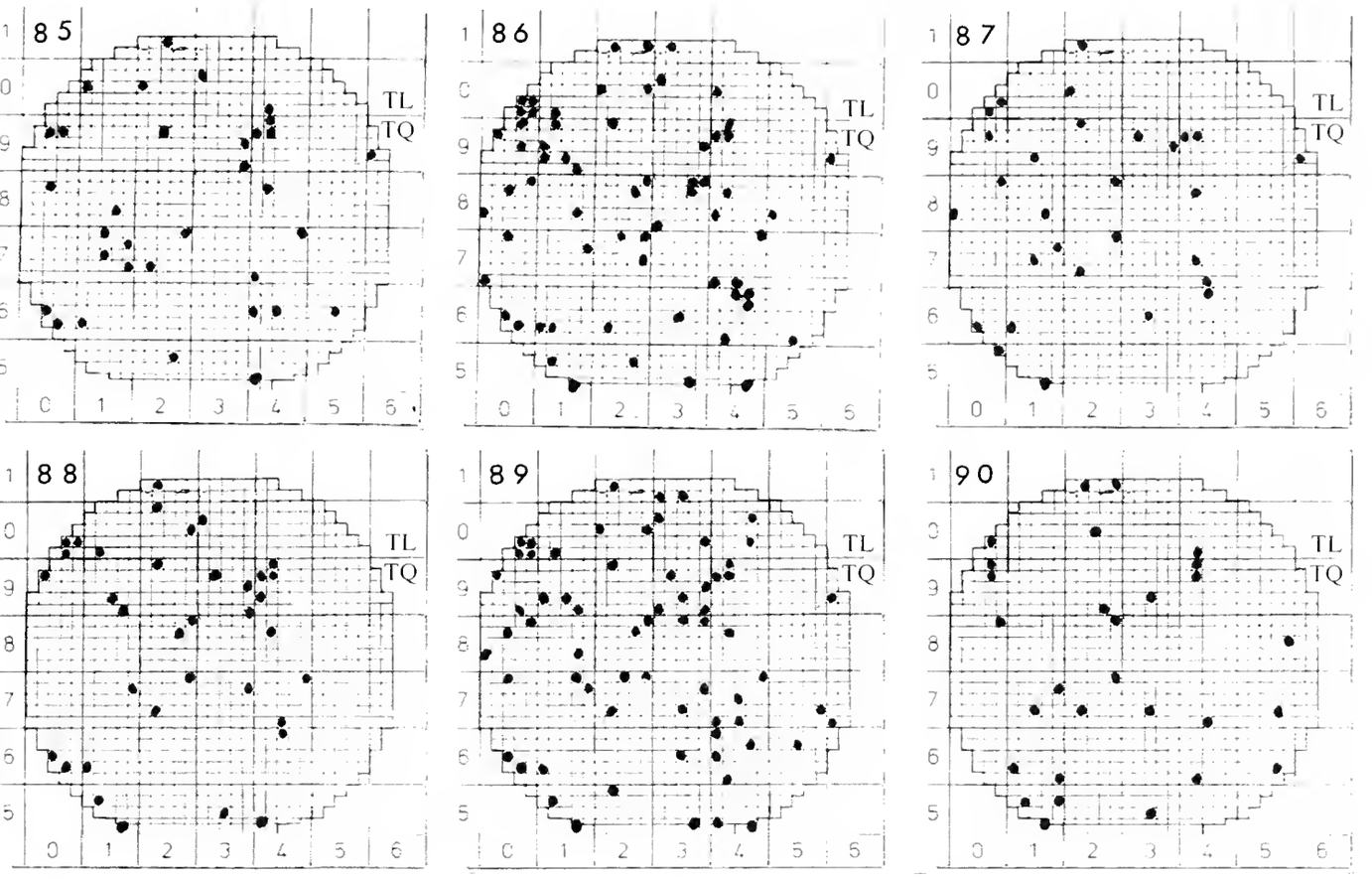
MAPS 49–60: 49 – *Brefeldia maxima*. 50 – *Comatricha alta*. 51 – *Comatricha laxa*.
52 – *Comatricha nigra*. 53 – *Comatricha pulchella*. 54 – *Comatricha rigidireta*.
55 – *Enerthenema papillatum*. 56 – *Lamproderma scintillans*. 57 – *Paradiacheopsis cribrata*.
58 – *Paradiacheopsis fimbriata*. 59 – *Paradiacheopsis solitaria*. 60 – *Stemonitis axifera*.



MAPS 61–72: 61 – *Stemonitis flavogenita*. 62 – *Stemonitis fusca*. 63 – *Stemonitopsis typhina*.
64 – *Symphytocarpus flaccidus*. 65 – *Badhamia foliicola*. 66 – *Badhamia panicea*.
67 – *Badhamia utricularis*. 68 – *Craterium leucocephalum*. 69 – *Craterium minutum*.
70 – *Fuligo septica*. 71 – *Leocarpus fragilis*. 72 – *Physarum album*.



MAPS 73–84: 73 – *Physarum bitectum*. 74 – *Physarum bivalve*. 75 – *Physarum cinereum*. 76 – *Physarum compresssum*. 77 – *Physarum leucophaeum*. 78 – *Physarum robustum*. 79 – *Physarum viride*. 80 – *Diachea leucopodia*. 81 – *Diderma effusum*. 82 – *Diderma floriforme*. 83 – *Diderma hemisphaericum*. 84 – *Didymium bahiense*.



MAPS 85–90: 85 – *Didymium clavus*. 86 – *Didymium difforme*. 87 – *Didymium melanospermum*. 88 – *Didymium nigripes*. 89 – *Didymium squamulosum*. 90 – *Mucilago crustacea*.

Book review

Leonard Jenyns. Darwin's lifelong friend. Edited by Ian Wallace. The Bath Royal Literary and Scientific Institution, 16–18 Queen Square, Bath BA1 2HN. 2005. 372 pp. Hardback, £18 until 1 January 2006, after which £20; p. & p. in UK £4.50. ISBN 0 9544941 1 3.

A Victorian naturalist and his world is an additional subtitle embossed on the front cover of this impressive volume. Much of the material on which this limited-edition book is based drew on rare material in the Bath Royal Literary and Scientific Institution collections, and Professor Ian Wallace, a past chairman of the Institution, has done a magnificent job editing a vast amount of information. He acknowledges the collaborative venture involving many volunteers, including scholars and curators of artefacts of Victorian natural history. The Foreward is by Roger Jenyns, a great-great-great nephew of Leonard Jenyns (1800–1893). The whole is much enhanced by the inclusion of over seventy illustrations of historic and archival interest. And how well known is it that in 1831, when Captain Robert FitzRoy was looking for a naturalist to go around the world with him on H.M.S. *Beagle,* it was Jenyns who was first approached. He declined, partly because his health had never been good, and also, as he had just accepted a chaplaincy, so the offer was made to Charles Darwin.

In Part One we are introduced to 'Leonard Jenyns in the context of Victorian science'. In the first half of the nineteenth century, to be a clergyman was a good choice of profession for anyone interested in natural history. In fact, many of the clergy also figured prominently in fields other than natural history, for example, as antiquarians, archaeologists or historians — all interests that depended on the availability of leisure time which some clergy could afford.

When Jenyns was thirteen he went to Eton and whilst there he borrowed a copy of Gilbert White's *Natural History of Selborne,* copying out and learning sections of it. Later, in 1843, Jenyns edited a new edition of *Selborne,* providing up-to-date commentary on White's text. In 1878, Jenyns entered St John's College, Cambridge where he met Darwin's mentor, John Stevens Henslow; and fourteen years later Henslow married Jenyns's sister Harriet. Part One concludes with the Jenyns collections — library, scrap books, meteorological and other manuscripts, herbarium, and shell collection.

Part Two forms the bulk of the book, starting with around seventy pages of 'Chapters in my life' followed by 'The naturalist network' containing reminiscences of Yarrell, Selby, Johnston and others, and a fine memoir of Henslow. Then comes 'Observing nature' with Jenyns's *A Manual of British Vertebrate Animals* (1835), followed by the raison d'être of his revised edition of *Selborne,* and then 'Observations in natural history' and 'Observations in meteorology'. 'The final years' opens with 'An obituary of C. E. Broome', who, with Jenyns, was an original member of the Bath Natural History and Antiquarian Field Club, then 'The Selborne Society' and lastly 'A valedictory letter to the Bath Field Club'.

Part Three comprises 'The Jenyns correspondence' which reprints many letters from well-known naturalists, including Darwin, Henslow, J. D. Hooker, Sedgwick and Yarrell. In all, Jenyns had correspondence with over 240 scientists or institutions. A four-page 'Biographical register' is a most useful inclusion.

This book was launched at the BRLSI on 24 September 2005. Professor Wallace presided over a programme in which several speakers contributed to topics covering highlights of Jenyns's life, his collections held at the Institution, and the lives of Victorian clergyman-naturalists.

Unfortunately, I was unable at the last minute to attend the launch, but now, in the short period available between receiving my personal copy and preparing this brief review for the printer, I have no hesitation in commending the book to all who have an interest in the history of British natural history. The BRLSI are to congratulated in enabling the life of Leonard Jenyns to be brought into proper perspective and appreciated in this way.

K. H. Hyatt

The memorial to Cyril Castell

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Abstract

Cyril Castell (1907–1972) was a leading member of the London Natural History Society who had, by his legacy, enabled its finances to become prosperous. His memorial is a headstone on grave TB 266 in Wimbledon Cemetery. It is unique in mentioning the London Natural History Society and displaying its emblem as a centrepiece. It was erected in 1980 and seven different lichens had colonized the top of the stone by 2004.

Introduction

Cyril Castell was a leading member of the London Natural History Society for much of his life, becoming president for 1957 and 1958. He was especially prominent as a botanist and ecologist, and in conservation, and led the Survey of Bookham Common for many years from 1941 until 1967. He was kind and helpful, modest, and was held in high regard by all who knew him. Cyril spent his working life employed on fossil molluscs in the Department of Geology at

the Natural History Museum, then called the British Museum (Natural History). He was an only child and lived with his parents at 52 Graham Road, a modest semi near Wimbledon Station, usefully situated for travel because he never learnt to drive and did not ride a bicycle. His father died when he was comparatively young, but his mother lived on until 1971 when aged ninety-three. She was quite domineering, and it may have been her influence which inhibited Cyril from seeking a wife. He caused a surprise at the museum by insisting on retiring when aged sixty in order to devote full-time to his hobbies; at that time the retirement age was flexible. Immediately he purchased a cache of expensive new equipment but this optimism was unfortunately short-lived. In November 1967, five months after retirement, he suffered a severe stroke which prevented any further fieldwork and, indeed, confined him to his house. When he died in 1972 aged sixty-four he left almost the whole of his estate, including his house, to the London Natural History Society, with the hope that one day the money might be spent to purchase a headquarters. This did not materialize, but his generosity enabled the Society to become affluent with the subscriptions pegged for many years for the lasting benefit of both existing and new members. Geoffrey Beven (1973) provided a detailed obituary with an excellent photograph, followed with a bibliography by John Cooper (1973).

Memorial

It was John Cooper, who worked in a junior capacity to Cyril at the Natural History Museum, who proposed that the London Natural History Society should finance a headstone in order to mark Cyril Castell's grave. The stone was erected in March 1980 and is still in fine condition. It is in Wimbledon Cemetery, off Gap Road in the London Borough of Merton. It is situated in the cemetery extension in the north-west corner towards the railway, at grid reference TQ 255 716. The grave number is TB 266, and it is easily found by following the numbers marked on other stones. It is a short headstone of limestone with a curved top. The front is west-facing, carved with a centrepiece below which is an inscription. The centrepiece depicts a house sparrow *Passer domesticus*, and represents the official emblem of the London Natural History Society. The bird faces left, as was prevalent when it was introduced. The inscription reads:

In memory of

CYRIL PHILIP CASTELL

born 30 June 1907

died 25 February 1972

who gave outstanding service to the

London Natural History Society

Also his parents

RICHARD and EMMA

The headstone is unique in that it is evidently the only memorial in existence to mention the London Natural History Society and to display its emblem.

The vertical surfaces of the stone are mostly bare apart from some algal and lichen prothallus growths. However, in 2004 the horizontal top of the limestone was covered with seven crustose lichens. The taxa represented were *Caloplaca citrina* (Hoffm.) Th.Fr., *Candelariella aurella* (Hoffm.) Zahlbr., *Lecania erysibe* forma *sorediata* J. R. Laundon (fertile), *Lecanora albescens* (Hoffm.) Branth & Rostr., *L. dispersa* (Pers.) Sommerf., and *Verrucaria nigrescens* Pers., as well as an unidentified dark grey sterile crust. It should be interesting to observe any changes in future years to this lichen community.

References

BEVEN, G. 1973. Cyril Philip Castell, 1907–1972. *Lond. Nat.* **52:** 121–125.

COOPER, J. 1973. Bibliography [of C. P. Castell's publications]. *Lond. Nat.* **52:** 125–129.

Book reviews

Everything you always wanted to know about birds . . . but were afraid to ask! Stephen Moss. Christopher Helm/A & C Black. London. 2005. 192 pp. Paperback £9.99. ISBN 0 7136 6815 6.

I really enjoyed reading this, and as it is written in chapters of questions with decent explanatory answers with the odd quirky fact, it was easy to dip in and out of.

My favourite facts were the emperor penguin having been recorded diving to a depth of 265 metres, that the brown thrasher of North America knows up to 200 different songs and that the egg of the now extinct elephant-bird of Madagascar weighed up to twelve kilogrammes.

It also answered all those questions you feel stupid asking such as 'do birds know when to migrate?', 'how often do birds eat?' and 'how do we know when a species has become extinct?'

Since the questions start on this level and then move upwards I'd recommend this book as one I would buy for a friend or relative you are attempting to convert into a birdwatcher, but one who is nearby enough so you can borrow it back from them!

I also liked the style it was written in as all the questions were answered without any patronizing: instead there was a sort of cheerful enthusiasm telling you the author really enjoyed this subject — making it an entertaining read.

DORINDA WILSDON

Ducks, geese and swans. Edited by Janet Kear, illustrated by Mark Hulme. Oxford University Press. 2005. Vol. **1**, pp. i–xxi, 1–446; Vol. **2**, pp. i–viii, 447–908, being volume **16** of ***Bird Families of the World.*** Vol. **1** with 30 colour plates, both volumes with text maps and drawings. £150 the set, hardback, ISBN 0 19 854645 9; Vol. **1** ISBN 0 19 861008 4; Vol. **2** ISBN 0 19 861009 2.

It is a joy to open a book of this quality, whose scholarship is matched by its handsome presentation and stunning illustrations. Janet Kear, the editor, who sadly passed away last year, was one of the best loved and most highly respected of WWT's staff, and a world authority on ducks, geese and swans. This book will be, for many, a memorial to Janet's lifetime's work into research and conservation of the world's wildfowl. It also includes contributions from several other WWT researchers.

It begins with an overview of the biology of wildfowl. Highlighting the great diversity of birds in this group, it discusses their evolution and adaptation, both anatomical and behavioural, to exploiting a wide range of wetland niches. We learn how life cycles are subtly adapted, for example in Bewick's swan, to take advantage of the short summer food supply in the arctic tundra, and of different nesting strategies, from hole-nesting smew, adopting nesting cavities carved out by black woodpeckers, to cliff-nesting red-breasted geese who share their territories with birds of prey. The fickle habits of some duck species, where the male abandons the female to rear her young alone (on the evolutionary grounds that she is better concealed than her more colourful mate) are compared with several species of swans and geese, where pair bonds form for life. The wonders of migration are explored, not only for scientific curiosity, but also in the context of life strategies, energy balance and the range of habitats which are utilized over the course of a full year. The ecological analysis leads naturally into a discussion of wildfowl conservation. Man's impact on wildfowl (for example, killing for food, shooting for sport, habitat loss and pollution) is balanced against the birds' impact on man (for example, sawbills on fisheries; brent geese on winter wheat). It seeks to pinpoint where conservation effort is most needed, and explains clearly how international efforts such as the Ramsar Convention, Bonn Convention and EC Birds Directive work towards protecting the most important sites.

A concise account of each species follows — morphology, taxonomic relationships, ecology, behaviour, life history and conservation status, together with an excellent map showing its distribution across the world. This is not a field guide, and indeed Mark Hulme's excellent colour plates are collected in the first volume only. However, it builds up a more holistic, global picture of the order Anseriformes, helping us to see where each species fits in the evolutionary spectrum, how it lives and what its prospects are for the future. Highly recommended to anyone with an interest in conservation and who likes ducks.

JAN HEWLETT

Conservation of the adder or northern viper *Vipera berus* in the London area

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Summary

A review of the decline of, and conservation activities for, the adder or northern viper *Vipera berus* within Greater London, the 3,200 sq km London Natural History Society recording area and with reference to its surrounding hinterland, totalling 6,400 sq km. One hundred and twenty-seven adder sites, approximating to populations, are mapped at the tetrad scale and date from 1800 to 2005. These records are found within the thirty-three London boroughs, and surrounding counties, including the old county of Middlesex, much of Surrey and parts of Essex, Kent, and Hertfordshire. Today in Greater London only five very small populations of adder remain, only two of which are possibly derived from original natural populations. Extinction here has been prevented by protective actions, restocking and introductions/reintroduction over the last twenty years. Outside Greater London and within the London Natural History Society survey area there are around a further eighteen remaining recorded populations most of which are small, many not fully protected and nearly all under threat. The past and present causes of adder decline are described and problems encountered in conserving adders in London over the last thirty years are discussed. Measures needed to conserve adders are described including habitat restoration and creation and management activities to avoid overgrazing by stock and minimize negative influences such as burning of fragmented habitats. Full listing of adder under Schedule 5 of the Wildlife & Countryside Act 1981 is considered appropriate, or protection via other existing or new legislation giving protection to the species and its habitat. New strategic approaches are needed to effectively coordinate suitable nature conservation activities within the adder's highly fragmented current state.

Introduction

A species under threat

In 2005 a considerable proportion of people still see no value to protecting snakes at all, anywhere and particularly one with a venomous bite. Snakes have suffered considerably as the result of their general image; they are vulnerable and unfairly victimized. In general, within London today, people are not so in touch with animals as those in previous centuries, when small mammals, frogs, toads, newts, snakes and lizards would have crawled into buildings, that were not sealed tight or centrally heated and that were swept out daily, dead or alive

or seen along tracks and roads during the daily walk to work. Bats seem to have successfully had their negative image reduced in recent decades via educational work but attempts to reduce the fear and dislike of snakes however will require considerably more attention. The fear of illness or injury (through disease, stings or bites) to humans, pets or livestock caused by flies wasps, bees and hornets, results in these invertebrates being destroyed in large numbers each year.

In the past, bigger wild animals such as brown bear *Ursus arctos*, wolf *Canis lupus*, and wild boar *Sus scrofa* have been eradicated with native wolf and wild boar only becoming extinct around 500 years ago. Other than accidents from motor vehicle collisions with deer and badgers, and disease transmission, there are few real threats from wild vertebrates to humans and relatively few deaths or serious injuries. Other wild animal species eradicated by humans across the London area, through a combination of habitat loss and persecution, include several birds of prey and particularly those considered pests to gamekeeping such as buzzard, hawks and possibly eagles. These species were lost during the nineteenth and early twentieth centuries (Fitter 1945).

Given a sensible approach, the general threat from larger wild animals is significantly overstated and the average risk to people is tiny compared to perils of ordinary households and gardens. It is as much the fear of threat and the ability of people to feel the need to kill to solve a problem that needs to be reduced, in order that the public do not eradicate certain types of animal. There are clearly some circumstances that require management, including culling to reduce risk and this may involve removing animals from areas where risks have increased. This is a function of wildlife management around the world and needs as much care, planning and attention to detail and welfare provision as any other forms of species and habitat management.

Despite persistent persecution over the years, the adder has fortunately proved harder to eliminate completely in some areas. Its secretive habits and distribution at low density at the edge of habitats used to give adders the ability to recover in numbers despite persecution and eradication attempts. The status of the adder in London was reviewed with adjoining areas of East Anglia in 1988 (Langton 1988) following previous indication of decline in east and south-east England, and amongst other regions of England by the Nature Conservancy Council (Cooke and Scorgie 1983). The 1988 review showed the perilous state of adders in London and elsewhere, where 79 per cent of the 109 known adder populations were small, fragmented from neighbouring populations and threatened by a range of factors. Hilton-Brown and Oldham (1991) confirmed the perpetuation of this trend.

Adder biology in brief

The adder or northern viper (Frontispiece) is one of the commonest snakes in the world, occurring across Eurasia in at least thirty-one countries from France to China (Langton et al. 1993). Rarely exceeding 600 mm in total body length in Britain, they are quite easily identified by the broad dark zig-zag line along their back. Males have a lighter grey or cream coloured background body colour and in females this is usually a shade of brown and the sexes are normally visually distinguishable from birth.

Ian Prestt's (1971) classic monograph on the adder gave three phases in the annual cycle for adder: the lying out and mating period, the feeding period and a 'return to hibernation' phase. Favoured habitats include lowland river, hay and grazing meadows and lowland heath, including woodland edge, and these habitats when they are partly modified by forestry and agriculture. During his study of 166 vipers at four study sites and over three seasons in Dorset, he found adders to be present particularly on sunny, south-facing slopes. Adders also live in areas with grasslands, wetlands, mineral workings, roadsides, embankments churchyards and large gardens (Langton 1989*a*).

Adders enter hibernation in September and October, occasionally later, with males emerging in late February to early March and females in March and early April. Hibernation sites or dens are frequently associated with raised ground and embankments and are usually south facing. Holes in the ground or fissures created by tree roots and stumps are used and mammal burrows may also be occupied. Hibernation sites need to be free from waterlogging, provide a frost-free hibernation area and the entrances positioned where morning sunlight can warm adders in spring and during the later part of their activity period in autumn. There is a three to five week lying out period in March/early April. Adults begin feeding in late May and continue in June and early July. Voles, shrews, mice, lizards, nestling birds and mammals are taken. Mating occurs from mid April to the end of May with a brood size of 5–10 but sometimes more. Female adders are normally biennial breeders, giving birth every other year or every third year (Prestt 1971), and according to how rapidly they recover body condition and fat reserves. This consequent paucity of available females generates male rivalry and can result in multiple paternity of broods. Otherwise the male to female sex ratio is usually evenly balanced.

Measured adder territory can range in any direction up to 2,000 metres. Over large areas of habitat adders are found at densities of around 4/ha but they congregate at communal dens where tens of individuals may hibernate in one general area. They are shy, seen during specific weather periods when basking leaves them exposed to observation and are otherwise generally hard to locate outside of suitable basking weather. For site assessment HGBI (1998) indicates that over twenty seen during surveys is exceptional, five to twenty good and below five represents low numbers. Maximum population sizes are not known but few are over 500 adults and these occur over the last few very large uninterrupted areas of Britain and there are few of these left in England. In the study area most populations are reduced to a few dozen adults or less and many isolated colonies of under fifty adults exist.

Adder bite is painful but rarely requires more than a few days' incapacity. There have been no human deaths for nearly thirty years although those with high allergic reaction to any kind of sting or injection of venom through the skin remain most vulnerable to anaphylactic shock following a bite. There are few documented cases of death in pets and livestock following adder bite although some owners have had pets humanely destroyed rather than undergo prolonged treatment. Thus the overall threat from adders is minimal. Nevertheless, as with bee, wasp and hornet stings, the bite is painful and potentially dangerous and should not be underestimated. In Britain there have been fourteen deaths attributed to envenomation from adder bite in the hundred years to 1976 (Reid 1976), but with the introduction of an effective Zagreb antivenom in 1969, death is now unlikely in other than very extreme cases. In comparison, people die in numbers every year as the result of bee, wasp or insect bite and as the result of injuries from accidents with horses and livestock.

The listing of the adder as a dangerous wild animal in British law under the Dangerous Wild Animals Act (1976) probably has to some extent reduced the casual interference with and taking of adders from the wild. It introduced a licence system with husbandry/veterinary checks for anyone wishing to keep them in captivity. Supported by other laws and regulations it effectively prohibits the unlicensed keeping of adders. The legislation surrounding capture, possession and transport of dangerous wild animals is complex. In particular the taking and releasing of adders may in some circumstances leave those translocating them liable for any damage done by released adders, giving extra reasons for proper process in the activity. While this liability was more perhaps designed for those releasing big cats in urban and rural areas there just might be scope for legal action in the rare event that a pet, livestock or even a human is injured or killed from a adder bite at an adder site established by translocation.

In giving adders a degree of statutory protection however, this law has possibly benefited the species as well. It has reduced to some extent the number of bites to humans from captured animals but also contributed to statutory bodies and landowners taking adder site loss and the need for adder translocation more into account.

Adder habitat preference

The open vegetation structure preferred by adders is described generally in Prestt (1971). Adders prefer well-drained and particularly sandy, chalky and other free-draining soils. The almost complete absence of adders from clay soils must to some extent be a direct function of the general difficulties that reptiles seem to find overwintering in soils that retain high levels of saturation or that get waterlogged by virtue of their position in the water table. Wet clay soils can be slow to warm up during spring and autumn, particularly in spring with low night time air temperatures. Across the north edge of northern distribution, restriction to sand and other free-draining soil such as chalk is a noticeable trend. Saturated soils are dangerous to reptiles with respect to drowning, freezing and damp-induced disease especially during winter dormancy. Reptiles need dry, frost-free places to overwinter and that these are much harder to find on clay and low-lying River Terrace Gravels. In spring, as the sun rises each day, reptiles need refuges in surface soils that warm up quickly too.

In this study, adders have been found almost exclusively either on sand, chalk or adjoining alluvium. North of the Thames, adder distribution is closely linked to the outcrops of sandy Claygate, Bagshot and Blackheath beds and local outcrops of high-level terraces of gravels, glacial sandy drifts and Lower Greensand. Absence from the lower-lying River Terrace Gravels is notable too. South of the Thames in Surrey, to the north of the county the adder distribution clusters along the Barton, Bracklesham and Bagshot sands and to the south the Lower Greensand; elsewhere adders occur on Blackheath, Woolwich, Reading and Thanet sands. Adder populations on Upper Middle and Lower Chalk soils are located in Surrey, Kent and Essex.

Overlaying the Surrey adder records with geology shows that on chalk soils there are relatively few records. This might be in part explained by under recording/reporting and the chalk being a narrow belt that is bordered to the north by a band of clay soil. One study along the M4 motorway just outside the study area showed that adders can occur on the argillic gleys (of the Hurst Association) described as coarse and fine loamy permeable soil mainly over gravel (Wells et al. 1996) and further work to categorize habitats and soils might inform nature conservation planning for reptile habitats, particularly in respect of habitat reconstruction.

Occasionally adders may stray onto clay (as for example at one former recorded location at Epping Forest) and gravel-based soils but only for a few hundred metres and in situations where a supporting population is, or has been present on an adjoining sand-based population. Exposures of sandy soils especially to the north of the Thames can be relatively small and naturally isolated as islands. Adders may have been naturally fragmented in these areas, at least in recent centuries unless they are all pre-1900 introductions, which seems unlikely. This may partly explain why many of the smallest habitat areas with recorded populations went extinct first, for example populations recorded around Hampstead and Highgate and Hornsey and in the London Boroughs of Harrow and Barnet.

Association with sand is also partly a function of it being less nutrient rich. Sands are capable of sustaining open uneven aged mosaic of dry heath and ling *Calluna vulgaris* dominated plant communities as a sub-climax that represents perfect habitat for many reptiles, as do other acid grassland communities. Chalk grassland and scrub too has expanded over the last 3,000 years or more through low intensity land use, more recently the grazing by rabbits and

clearance by humans for subsistence and then following organized agriculture and large-scale forest clearance.

Threats to adder survival

Habitat loss

Details of exactly how much of Britain was forested after the last ice age and how open the tree habitats were is still debated. Many believe that numerous open grazed areas within woodland were extended and maintained from the Bronze Age or earlier, meaning that the heath and grassland landscape has evolved with relatively low intensity human use for thousands of years.

More detailed evidence shows that land in and around London has changed considerably over the last 1,000 years but massively over the last 200 years. In the Middle Ages London's built environment was confined to a small area around the current city centre and away from villages, and thick forest would have covered many areas. South of the Thames however, open areas of heather and grass heathland with a range of woodland types extended through Surrey and in a narrowing belt towards the city centre. Norwood was the northern limit of the Great North Wood. Sporadic outcrops of heathland on poor nutrient sandy soil, together with more open marshy land on alluvial and perhaps other soils provided a broad corridor of open habitats that would have been very suitable for reptiles in a continuous band from Surrey into north Kent and south Essex. North of the Thames the dominant London Clay, glacial clay and low-lying flood-prone river terrace gravels restricted adders (and probably smooth snake *Coronella austriaca* and sand lizard *Lacerta agilis*) to the larger islands of lowland heath in old Middlesex, Hertfordshire and Essex several of which have nineteenth-century adder records and several probable records of the now extinct rarer species. The modern expansion of urban London did not really take off until the 1830s (Fitter 1945), but surrounding villages were growing steadily from medieval times. With a slightly more favourable climate than today until the seventeenth century, land clearance may well have increased the abundance and distribution of reptiles across the study area. The general start of the current decline in snakes and snake habitats was probably around 1850.

Even in the 1920s however, the centre of London was quite rural in character by today's standards. Since then, human population growth aided by new technology has driven a rate of change that has accelerated localized extinction of plants and animals. New agricultural and landscape design methods have caused many of the less mobile remaining species to be trapped in shrinking islands with little long-term viability. Change in and intensification of agriculture has played a large role in reducing adder habitat, with peak losses probably around 1930–1960. The massive reduction of lowland heathland, water meadows and grassland has been well documented. Simple changes such as the replacement of hand scything with machine harvesting of hay has reduced the survival prospects of species like snakes.

Loss of adder habitat to building development still occurs but is perhaps now less likely other than in south Essex and parts of Surrey. Recent sites include the building of a commercial distribution centre in the Aldershot area (M. Preston pers. comm.).

The development of motor transport and surface and underground railways systems has had a major influence on the level of public access to rural areas and use of public open space. This has brought people effortlessly to remoter areas at London's edge where the M25 now allows car users an easy day trip to anywhere within the study area. Over half a million people visit Burnham Beeches each year for example (Corporation of London website). The spread of roads and use of vehicles has since the 1960s brought one of the biggest

negative influences to secretive and sensitive vertebrate species, in increasing both private and public access to previously less-disturbed areas. In many cases, rabbit and fox burrows on road and rail lines have been subject to burrow gassing and this may well have killed many non-target species including reptiles. Conversely, the use by adders of roadside embankments, like rail embankments, has created habitat of some value, at least until trees grow up and shade the ground too much. There are reports of diminishing numbers of adders on the roadside of the Caterham bypass, where council-owned lands in Tandridge (on chalk downland) have become scrubbed over, reducing chances of adder survival along them. Snakes seem to colonize embankments, even those with motor vehicle traffic passing some 5–10 metres away (Wells et al. 1996), partly because noise is not such a problem to snakes and they get used to the blur of moving traffic. Humans seldom disturb them on road and rail embankments due to the difficulty of access and safety regulations.

The building of the M25 motorway and the extension and widening of major roads from its thirty junctions both within and outside the Greater London (GL) and London Natural History Society (LNHS) areas, has defined and compartmentalized land, facilitated expansion and access for further housing and industrial development and enabled the final disappearance of many of the remaining wildlife areas in their post-forest clearance, nineteenth-century rural character. As traffic density has increased it represents an almost impenetrable modern (post mid 1980s) barrier to dispersal for many small terrestrial animals such as reptiles.

Many large areas of open land have been reduced and divided by major road building and widening, including heathland populations of adders at Wisley, Ockham Common and Colley Hill in Surrey. The Channel Tunnel Rail Link is a modern example of large-scale surface disruption, but, as with roads, the newly constructed embankments offer considerable potential for future reptile colonization.

Habitat fragmentation and neglect

Many of the problems facing the conservation of heathland and grassland communities are made worse by virtue of their small size and increased edge area effects. Habitat loss in itself usually causes fragmentation, and fragmentation effects, once isolation begins, may be hard to counter. Fragmentation effects may be obvious in the case of the impact of a major fire or be much more subtle and hard to identify. Fragmented areas have an inevitable loss of stability in habitats and species richness and diversity, the process may unpredictable, sudden or take decades and the loss of species may not be noticed without specialist monitoring.

In Greater London, fragmentation and neglect has reduced reptile viability, particularly for adders, at several grassland and heathland reserves. Sadly in some cases insensitive habitat restoration and inappropriate management has resulted in cases of avoidable species loss or lack of recovery.

Neglect can also include keeping land looking like a natural habitat but effectively with depauperate species richness. Part of the problem is that for many species the minimum population viability has not been measured and there is a lack of training and funding to fine-tune nature conservation management actions. There is a need for managers to take a range of species as indicators of an adequate wildlife community and to manage for them alongside the general condition of habitat. Habitat can look suitable from a distance/botanical perspective but be sparse for typical fauna because of the way it has been managed. Improved methods to manage for both habitats and species are often a little more complicated. They are being implemented on some reserves with good results achieved for bird and reptile species interests but generally there is no consistent standardized approach for habitats utilizing a range of indicator plants and animals.

Neglect of habitats can be passive in the case of land just not being subject to nature conservation management, and made worse when site owners are unaware of the interests. At one of the remaining adder sites within the LNHS area, the pumping of waste silt from a lake into a low valley in winter 2004/5 threatened the population. The immediate area for silt deposition was used by adders for overwintering and the place with overwintering burrows was almost submerged, and perhaps would have been had it not been for intervention by a member of London, Essex and Hertfordshire Amphibian and Reptile Trust (LEHART) who spotted the activity and the work was stopped just in time.

Adder site size is an important factor. At the four snakes per hectare density (Prestt 1971, Langton and Beckett 1995), viable adder site-size for 100 snakes might be twenty-five hectares, or for 500 snakes, 125 hectares. In reality few are this big and if they are, much of the site is of lower value for basking or feeding and probably should not be counted. From a national survey by the charity Froglife (Baker et al. 2004), only 40 per cent of adder sites were over fifty hectares in size, and worryingly around 30 per cent of sites less than six hectares in size.

The effect of habitat fragmentation in lowering population viability in species and causing inbreeding has become easier to measure in recent years and amphibians and reptiles have been the subject of detailed studies. Experimental conservation measures to counter inbreeding are fortunately being trialed on adders, notably at Smygehuk near Lund in Sweden (Madsen et al. 1999, 2004). Here adders occur at a coastal meadow that is just 1 km long and 50–200 m wide (around 15 ha) and the nearest adder population is 20 km away. From 1981 to 1995 male adders declined from twenty-five to just four individuals and small brood size and still-birth was prevalent. In 1992 researchers 'borrowed' twenty male adders from another adder population, introduced them for four years then returned the surviving males to their donor population. The effect at Smygehuk, at least in the decade since, has been population growth, suggesting that the injection of alleles has brought improved and sufficient fitness to the population to rejuvenate it.

Nature conservation management

The process of what we now call nature conservation management has evolved, in part from forestry and agriculture, particularly cutting down or planting trees and growing grass for livestock feed. The need to protect and manage open areas for human use in a sustainable way in the London area became more apparent following large-scale forest clearances and increasing competition for land from the seventeenth century. From about that time the need for protection of wood as a source of fuel or for building, and for grazing and amenity rights became more obvious to local parishioners, and commoners' rights required defending to prevent over exploitation.

It may seem odd to consider nature conservation management as being a threat to some declining species. A substantial threat has been from grazing of livestock which has become particularly popular over the last twenty years. Although not for nature conservation reasons, from the 1970s an increase in the keeping of horses at high densities on grassland has increased in and around London and has itself created problems for wildlife, because as with stock grazing, control of grazing intensity is hard to achieve and grassland is often overgrazed. Recreational riding school stables stock to the limits of local grazing and may push the tolerance of local commons, greens and bridleways and horse access to their limits. Delicate microhabits can be trampled and eroded. In researching this paper it was startling to see the level of concern with which specialist conservationists view recent or current grazing efforts for nature conservation and consider it an overpromoted, erratic and difficult-to-control technique. The original lowland grassland management handbook produced by English Nature in 1994 did not adequately reflect the specific

need of reptiles and other faunal species (Beckett 1995). Invertebrates, reptiles and some birds that are sensitive to grazing levels will be disturbed by grazing animals, trampled, or left exposed by over grazing of the sward, loss of tussocks and developing open scrub or frightened to places where they are more likely to be predated or otherwise have reduced survival. Scrub too as a habitat has distinct conservation value as does its periphery while its juxtaposition with long tussocky grass and herbs forms another valuable habitat component for adders and other species. These include rare (and *Red Data Book*/Biodiversity Action Plan) listed bees, spiders and beetles that require a mosaic of young and old vegetation and young trees within chalk grassland, acid grassland and dry lowland heathland.

With stock grazing of habitats of nature conservation interest there are sometimes tributes to the use of rare breeds of livestock such as longhorn cattle that are considered traditional and appropriate. There have been numbers of cases where grazing is carried out on an experimental basis without adequate supervision and sites continue to be damaged. Partly in response to the problem nationwide, English Nature brought out a guide to impact assessment for insects and reptiles on heathlands (Offer et al. 2003). There are plenty of examples of overgrazing in the study area. At one of the potential adder recolonization/reintroduction sites in south-east Greater London, a site under nature conservation management, no adders have been seen since grazing with sheep began five years ago and the potential to recover adders may have been lost. There are other problems with cattle grazing on adder habitat on SSSIs and even National Nature Reserves. It has not been demonstrated that adders and other basking reptiles are 'remarkably tolerant of large animals' grazing in their habitat (Offer et al. 2003). It may be true that at very low density and on large sites the likelihood of death or disturbance to animals or their fragile microhabitats is low, but just a small group of sheep, cattle or horses can easily trample and disrupt or destroy fragile microhabitats. Often just moving one or two animals around slowly but regularly in temporary electric fencing is substituted with cruder schemes. Too often grazing is proposed as the habitat panacea with little sensitivity and with ridged boundary enclosures being a very poor mimic of shepherding/herding.

Grazing only works on reptile sites on a very large scale, where it can be an effective tool to clear and recover grassland sites that are overgrown, as the goat flocks of the Kent Wildlife Trust have shown, but it needs to be avoided in small fragile areas where it can contribute to the loss of species. Grassland may take up to a decade to denude of nutrients, even given the daily removal of stock to prevent dunging recycling nutrients. Grazing of dry lowland heathland with stock in England has seen some dreadful results on sites of less than a few dozen hectares and can be highly detrimental to reptile populations in various ways and there are few sites of this size remaining in the study area. The problem is that sites are too small and rotation of grazing in compartments representing less than 5 per cent of each site over a long enough period is just not a practical proposition.

Care must be taken with other techniques too. Insensitive actions taken in soil nutrient stripping via mechanized turf cutting have been recorded in the Netherlands. Here a 'Plaagen' machine was put into operation cutting off surface soil and vegetation. It was misused in a similar manner to some grazing activities by site managers wanting to see an immediate impact over wide areas, and despite official reports warning against misuse causing the depletion of reptile populations (Stumpel 1987).

To generalist managers faced with neglected habitats however, the loss of a few rare or sensitive species in the short term may be a price considered worth paying to regain an earlier succesional habitat condition. Such an approach may then rely on the chance natural recolonization of more mobile species

such as birds and, although it can take considerable time, invertebrate species. The long time-scales of management operations often mean a lack of continuity and surveys to identify loss of species or recolonization are rare.

Once habitats are recovered from a state of severe neglect, a lot can be achieved by humans working with scythe, hand saw, billhook and axe. The fostering of this method of working in preference to machinery needs to be promoted. As with grazing, over-zelous scrub removal and flailing often following use of tractor-mounted equipment, can damage microhabitats, create stark ecotones and be hard to time correctly in the year, e.g. in wet winters, ground can suffer 'rutting up' by vehicles. Work with hand tools is also recommended with scrub management.

Scrub/stump removal

Adders are often seen basking on the sheltered side of isolated gorse bushes and near to the base of old birch trees where they frequently find refuge. Bonfires to burn up cut scrub are sometimes placed on tree stumps to kill them and this practise must risk killing reptiles and should be avoided. Stumps are important for invertebrates too, especially the unseen underground section. These are often liquid in nature so fires convect heat and destroy deep below ground, as well as above. There are over 1,700 species if invertebrate in the UK which depend on decaying wood habitat for their lifecycle, and 38 per cent of invertebrates associated with decaying wood habitats have formal conservation status (Alexander 1999, 2002).

Fire damage

Like grazing, the use of fire to remove scrub or mature heather has until recent decades been seen as somehow traditional, although the banning of stubble burning has helped increase awareness that burning is an outdated nature conservation practice. Random natural fires and arson cannot be controlled. Small-scale burning has tended to be defended on the basis of reducing the chance of a major fire burning everything, but is often simply done because it is cheaper than cutting and removal.

Deliberate fire setting can be disastrous to wildlife and in very dry summers the risks are often very high. On grassland, fires can kill reptiles but are usually surface burns that move quickly and animals well below ground can survive. On heathland the burn can be slow and deep, killing animals more effectively. Reptiles often cannot out-slither a fire but seek litter layer or subsoil refuge where they are cooked or asphyxiated. Invertebrates are also badly effected by grass and heather fires, decaying plant roots below the surface supporting hoverflies and craneflies for example (C. W. Plant pers. comm.). Fire is a particular threat where gorse is allowed to grow uncontrolled and without fire breaks that may assist firefighters and limit the spread of ground fire. Thursley Common, situated next to a busy road, is a good example of an area where reptile survival in some areas is defined as much as being between fires as in any other state. In 2004 Surrey police eventually caught a fire-raiser who had carried out a campaign to burn as many heathland sites as possible in the previous year. One of the Greater London adder release sites suffered almost complete burn of its remaining dry heath habitat in recent years and regular volunteer fire patrols, particularly in windy weather during dry spells are increasingly important. Fire is a factor at most sites.

One of the reasons that fires are so damaging to reptiles is that once a fire has taken place, due to the loss of cover, predators are attracted to reptiles trying to locate lost habitat and the following period may see the removal of many or even all surviving reptiles from an area, further exacerbating the initial effects of the fire.

Persecution and disturbance: deliberate killing and injury

Since the early spread of built-up London away from the Thames, there has probably always been the killing of adder, smooth snake, grass snake and slow-worm around houses and gardens as well as elsewhere in the countryside as a reaction to protect householders, pets and livestock. With population growth and more intensive land use in the 1800s, recreation produced new threats to these species with reports of groundsmen, gardeners, park keepers, gamekeepers, golf course workers and greenkeepers amongst others, killing adders.

At one of the last remaining critically endangered sites for adder in north London that is likely to have been a population of natural origin, with records from the 1940s, there are records of snakes being killed by billeted American servicemen during the Second World War. There is also a local account from 1974 that '. . . an after work stroll revealed something very unexpected — a young adder! Adders were believed to be extinct in Middlesex and in the (local authority) Ranger's opinion these had been released. Unfortunately, he was killing them on sight'. Another example is the severity of adder killing at Burnham Beeches being sufficient to cause one member of the public to remove adders for release to Epping Forest where they were considered safer.

One more recent account stands out as an example of how far public opinion and actions needs to be changed. It comes from the edge of the study area, in Berkshire, where one of the authors (TESL) followed up an urgent telephone report from a worried pest control company. The circumstances were that a small, probably introduced colony of adder, grass snake and slow-worm were present in large gardens at the back of terraced housing, where notes made at the time recorded are as follows:

> 'A soil-covered rubble mound along and between the back of several properties had combined with several abandoned gardens to allow the adder population to grow. A 14 year old boy is catching and burning the heads off adders with a garden flame-gun. Others had been skinned as trophies (Figure 1). The boy had possibly

FIGURE 1. Adders killed unlawfully and skinned for trophies. *Photo: Tom Langton*

introduced the reptiles a few years before and ended up showing me a number of reptile sites locally, one of which, close to a military barracks he claimed had "different" snakes and he described perfectly smooth snake, but we failed to find them before the military police arrived. The mother who was a state-registered nurse had memories of a baby suffering from snake-bite in a hospital and this had caused her to turn a blind eye to her son's activities although she did recognize that what had happened was wrong and was concerned that the actions had been unlawful. In consultation with the RSPCA those involved had admitted guilt and ignorance, cooperated and shown remorse and it was decided not to take legal action. The tale became even more involved when I was pointed towards the neighbour over the fence who was also part of the adder eradication effort. She was sunbathing on a low set deck chair wearing wellington boots (to protect her feet from adders) and with an air rifle by her side. Any "snake" seen on the close-trimmed lawn was shot at and she claimed to have had several hits in previous weeks although dead or injured snakes could not be found. Explaining the Wildlife and Countryside Act to her I found that the glass lean-to of the house had a large glass fronted cages lining one wall, full of iguanas. She and her husband clearly cared for exotic reptiles but had no affinity at all with native reptile life.'

Other threats

Use of off-road vehicles usually without permission may damage and erode habitats in remote areas. This was once mainly motorbikes but recently includes four-wheel drive vehicles. Access has been made easier in some areas by the new network of grass strips around arable fields.

Adder deaths on highways, and particularly country lanes, has been largely unmeasured but probably has made a significant contribution to mortality in adder population declines. The gassing of rabbits in mammal burrows, that are also shared by reptiles and other species is now better regulated in the study area but still continues with a role in local adder declines, particularly if it is done when adders are overwintering.

Increase in pheasant stocking of woodlands adjoining reptile habitat, and at higher densities than previously viable has also raised concerns. Pheasants are known to peck at and kill or fatally injure small reptiles but not necessarily eat them. The domestic cat will also take on adders (Figure 2) and their mongoose-like ability to evade adder bite is notable. Their past role in declines is suspected, they may well erode local populations near urban areas.

Possibly the earliest references to threats to snakes in and around London is their collection for trade purposes, in Gilbert White's (1788) reference to 'the London viper-catchers'. The heating of snakes to melt and separate body fat as a light liniament 'oil' for medicinal human use in Europe has early origins and becomes better recorded from the 1800s together with its use as a curative for poisoning, see e.g. Quennell's (1987) edition of Henry Mayhew's interviews of London traders. Like snake oils from rattlesnakes in the USA its proven value as a remedy is not recorded and dubious beyond being a skin moisturizer and being harmless to ingest. It is interesting however, that the annotated edition of Gilbert White's account of Selborne in Hampshire by Frank Buckland (1875) states that around a hundred years later, demand may be decreasing, as 'there is no sale for them (adders) in London now — only a gentleman or two might want them'.

This might just have been a slight lull in demand because LNHS member Oliver French (1983) reported from accounts of the 1920s, the situation for the famous LNHS study area of Bookham Common in Surrey where adders are today extinct:

'Adders . . . are scarce on Bookham Common these days, but it seems they may have been abundant sixty years ago. An elderly acquaintance of mine who used to reside in Bookham, tells me that between 1919 and 1924 . . . two or three "rough looking chaps" used to arrive each year by train from London's East End. They were equipped with closely-woven rush baskets with lids that were secured by toggles, and these were used to hold the adders caught on the Common . . .. My friend used to watch them at work and says they always made sizeable collections.'

FIGURE 2. The ability of cats to avoid adder bite is notable. The cat has just killed this adder. *Photo: Tom Langton*

Brusher Mills, the famous New Forest snake catcher, also used to melt the body fat of adders by boiling or roasting to make a light linament for sale. Other snake catchers started to send snakes to London Zoo to feed collections of snake-eating specialists such as cobras.

Over the last thirty years there have been sporadic reports of adders collected both within and outside the study area for sale and exchange and these must result in the occasional single and out of place adder record when they escape or are released. There has probably not been significant trade collecting since the 1970s but this is not certain and is hard to detect. Collecting of adder venom was still being carried out in Dorset in the early 1990s for sale to schools of tropical medicine. Today the remaining populations in the study area are so small that collecting of any animals could be highly damaging. There have been rumours of sale of batches of adders to the USA for collectors but these too have not been verified and it is not known that central government has issued a licence for sale of adders since this became a legal requirement at the start of the 1990s. In one case at a now former adder site in Greater London in the mid 1990s a man who 'declared' a near-dead adder at the site manager's office (as he took it away) was later found to be a taxidermist.

Photography

One threat mentioned by several people in recent years is a craze for photography students to photograph adders. This could well in the future add to the pressure on wild populations, in one case a class of thirty were given a summer assignment to photograph adders. Sites may become vulnerable through the posting of site details and grid references on websites and this is a problem that requires monitoring and the editing of site detail and is a further reason why exact adder localities should not be publicly advertised.

Study area and methods

This review includes land within the LNHS boundary of 3,200 sq km and an area of equal size beyond. The total review area is a square that falls along Ordnance Survey 10 × 10 km grid lines in total 80 km by 80 km (6,400 sq km). Its south-west corner is at Thursley Common in Surrey, its north-west tip is close to Leighton Buzzard in Bedfordshire, its north-east corner a little way east of Great Dunmow in Essex and the south-east corner is close to Tunbridge Wells, Kent (Figure 3). The rural to urban landscapes include parts of eight counties including, to the north of the Thames all of the old county of Middlesex, which is now almost completely to be found within the Greater London boroughs, and 20 per cent or so of Hertfordshire and Essex. Small areas that represent just a few per cent of Bedfordshire, Buckinghamshire and Berkshire are included at the west edge. South of the Thames the study area includes around 70 per cent of Surrey, and 20 per cent of Kent, including a substantial proportion of the area of dry lowland heathland and downland, situated within the Weald (Wooldridge and Goldring 1953).

The review relies on the experiences of many of those working on adder conservation since the 1960s. Those involved in adder survey and conservation were interviewed and local record centre records reviewed in addition to the main LNHS records. Research to locate historic records for this review was undertaken but is by no means complete. There are probably more records that indicate past occurrence of adders to be found in newspapers/journals, local natural histories, diaries and records (such as the gamekeeping records of private estates where the number of adders killed

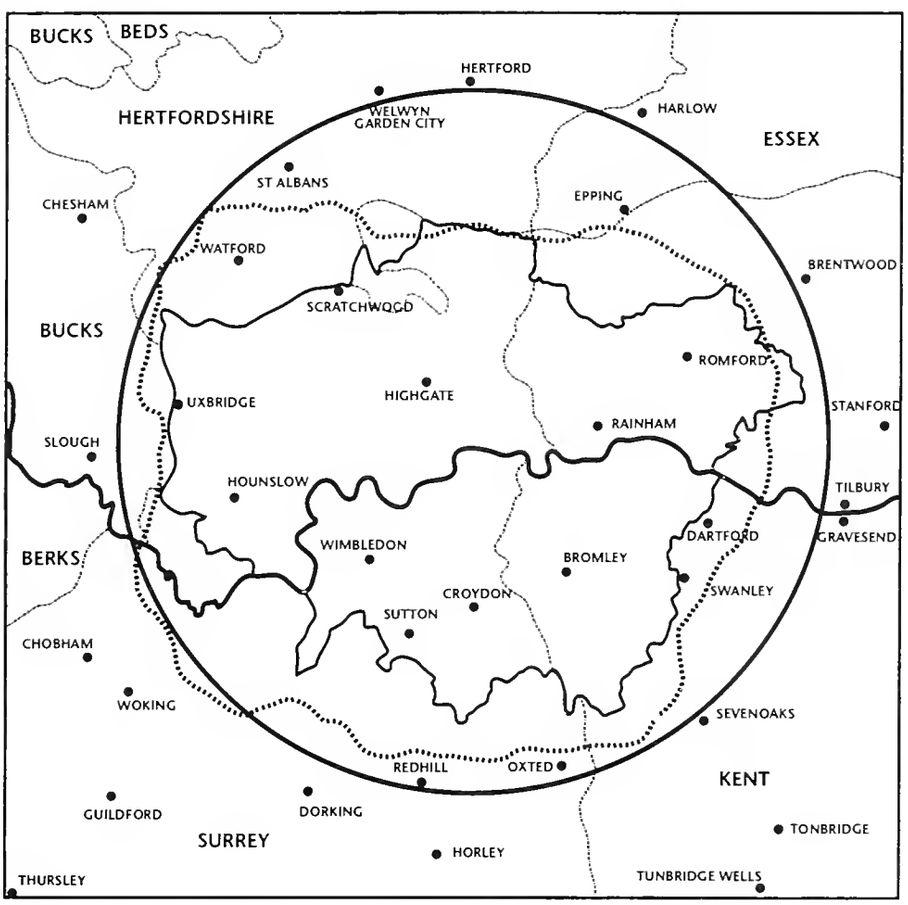

FIGURE 3. Study area, 80 × 80 km, showing the outer edge of the Greater London boroughs (solid irregular line), the London Natural History Society recording boundary (solid circle) and dotted line the M25 motorway. The bold line from west to east is the River Thames.

may be recorded), some going back several centuries. Due to the potential for misidentification of adders with grass snake and slow-worm and dubiously attributed poisonings to adder bites, all material needs to be considered with caution. In this review records have been accepted from experienced naturalists and fieldworkers and other selected reports that have good descriptions of adder body features markings and colours and that appear to be objectively reported. Records have not been included if information is insufficient and a few not accepted because of lack of a reasonable level of certainty or when an animal is clearly or highly likely to have come from a release or escape. Adder bites are hard to verify without a full report and many are insect stings and bites.

Records can generally be divided as coming from places with one-off records and those with multiple records. Adder records seem to fall into these categories; there are places where records are frequent, made sometimes every year in the same place for a decade or more and are centred around overwintering dens and lying out areas where snakes are easily seen in spring and autumn. A population is often based upon them for much of the year, and it is often a fairly small area. Around such a core area, adders may be seen typically within a 500-metre distance but sometimes up to 2,000 metres away. On larger sites, lower density of adders may be found between these areas and adders may intermix when they visit a common summer feeding ground. However, the existence of such situations is rare today, as habitat size needs normally to extend to over one kilometre or more in any direction for the populations to be considered as separate. Equally, as part of natural dispersal patterns of many animals, lone adders may disperse to distances of five kilometres or more and turn up in unusual places such as gardens. If by chance a male and female adder meet and breed, with animals reaching an average of ten years and sometimes up to twenty-five years or more, adder records can occur in tiny habitat patches or sub-optimal habitat for several decades. Numbers are very small, hard to locate, but may give the false impression that a viable population persists. In this study the use of the term 'site' generally means a population centre, as defined by records within 1,000 metres of a fixed point. Sites rarely include two separate populations but often mop up single records within two kilometres of a known population centre. Care is needed as adders may not always hibernate communally.

Results

Change in adder distribution in and around London since 1850

The outer edge of the thirty-three London boroughs in Greater London (see Figure 3) encloses within it many of the biggest areas of continuous open countryside including areas that are known to have held adders since LNHS recording began seventy years or so ago. The lack of viable adder populations in Greater London has been noted over this long period, and despite seven decades of fairly active recording across Greater London, no substantial adder populations of a theoretically long-term viable size are known to have existed.

Some early but inconclusive clues exist, such as a field compartment in Richmond Park known as 'Adder Down' in 1639 during the reign of Charles I. Roads now called Snakes Lane and Adderley (ley = field) may indicate past distribution of reptiles. Did Wormwood Scrubs (previously 'Wormeholte' = Snakewood and 'Wormer's Scrubs') have snakes and was there adder as well as slow-worm *Anguis fragilis* that is reported from nearby Old Oak Common?

An early account, possibly relating to adders comes from the naturalist Richard Jeffries who apparently spent much of the time that he lived in London at Surbiton. In *Nature Near London* (Jeffries 1883), one of his several titles, he mentions that 'The gardeners employed at villas close to the metropolis occasionally raise an alarm, and profess to have seen a viper in the shrubberies'. This might be a reference to grass snake or slow-worm but

between him and London are the heathlands of Wimbledon Common and Putney Heath and records suggest adders may have been here in the last century. Adders are not however listed as present in Walter Johnson's (1912) account that mentions grass snake as present. Although it could well have been an old locality, its history is not quite certain. One published report from the mid 1930s by a trainee vet near Wimbledon Common (Lloyd-Jones 1966) is as follows: 'I was astonished how many came in with Adder bites. The bitten dogs were astonished too. English dogs don't expect to meet snakes and tend to prod them with their noses when they do. The Adders on Wimbledon Common took strong exception to this indignity and were quick to retaliate. Their bites can be nasty'. Reliable records suggests a few adders were present in the late 1970s (David Howdane pers. comm.) and one in the 1990s either as a relict population or as introduced animals. Larger greenspaces like these may be places that people take animals for release and some adder localities may result from an introduction by someone thinking the area suitable for them and needing to release them. The typical characteristics of this is sporadic records of adders over a period of a few years without a known (and noticeable) lying out area where adders are regularly seen.

Presumably the decline of adders in the Greater London area began earlier that in the surrounds and there are several literature references to adders declining in the nineteenth century. In the old county of Middlesex, records exist from what are now the Boroughs of Camden and Haringey, where populations are mentioned by M.C. Cooke (1893): 'It is said that they [adders] are more than usually common in the dry woods on the chalky soil of Kent, and they certainly come nearly within the sound of Bow bells, for they have been met with in the little woods around Hampstead, Highgate and Hornsey.' This must include the Hornsey Bottom Wood area, now known as Queen's Wood. Thomas Bell reports an adder record from 'Hornsey Wood' around the 1830s (Bell 1839). All of these localities are on the Claygate and Bagshot sandy soils. The Hampstead Scientific Society (1913), in their volume on *Hampstead Heath, its Geology and Natural History,* make a simple statement that despite persistence of grass snake (in the face of them being killed, alongside slow-worms on the heath), that adders 'have long since disappeared' suggesting perhaps final decline and extinction in the twenty-year period 1893–1913. This is a time when human population increase and urban spread would have intensified land use to a point where adder eradication through systematic killing would have been quite likely to have been effective.

A reliable early account for adder in Greater London, this time south of the Thames, is in the London Borough of Sutton, made as the result of enquiries by Gerald Leighton (1901) from a location now long built-over with soils being a mixture of Upper Chalk, Dry Valley Deposits, London Clay, and Woolwich, Thanet and Reading Sands. A correspondent of his who gives an account of being bitten and treated for adder bite as a schoolboy wrote 'Many years ago I knew Sutton to be the happy hunting-ground of the adder. The Benhill Wood is now, I believe, Benhill town, but still the chalk pits in the neighbourhood must even now be their home.'

Fleeting references for adder decline in London include Drakeford and Sutcliffe (2000: 163); 'numbers have plummeted since the Second World War'. Recorded probable adder extinctions since 1950 include the last relict population in the London Borough of Croydon where one of the authors (KFC) witnessed the last remaining adder at Shirley Hills in the 1980s on a small patch of heathland on the typical Blackheath, Woolwich, Reading and Thanet sands. A population in the London Borough of Bromley is also considered to have been lost at some point before the 1970s although some records suggest that individuals may have hung on until the area was restocked in the mid 1980s.

North of the Thames in the London Borough of Barnet, there are reports from a site around Scratchwood where LNHS records report adders in 1940 and as present until 1959 on the banks of railway tracks in railway sidings. Definite adder records are not known since then and the upheavel from motorway building may have been a factor in their demise. The geology here is Claygate Sand with some Pebble Gravel and London Clay. Nearby, on open ground near Sudbury Hill Station in Harrow a possible adder bite was treated in hospital in May 1961 (source *The Daily Telegraph*). The land here is London Clay but close to Claygate and Bagshot Beds. These records together may indicate the final loss of adders in the area.

Since 1940 at several places on the outer Greater London boundary small numbers of sightings, some repeated in the same place, indicate that small numbers of adders were remaining, widely dispersed but occasionally breeding. Adder densities similar to those seen at healthy populations outside London are not reported, suggesting that in historic times adders have been present only in small enclaves, either as relict sites of often dispersed individuals, or following restocking/translocation (and without significant habitat creation). Almost all, without specific conservation help, have been in the final stages of extinction.

The 1991 review of adder within the LNHS recording area (Langton 1991) listed forty-three adder records pre-1980 and thirty-two for the later period 1980–1990, when biological recording across the London Boroughs and particularly Greater London was relatively intense. Few adder sites were thought likely to escape attention of the many active amateur and professional wildlife surveyors, who were considered almost certain to report any adder sightings and who did frequently report grass snake and slow-worm. While this does not necessarily represent a decline in rate of recording, many records in the later period are repeated sightings from the same sites and as a result the near extinction of adders was reported at that time.

In 2005 there are five remaining adder sites within Greater London. The last, of possibly natural origin, was discovered around ten years ago in Essex. Of the remaining four, one is a small-scale introduction, one is thought to have only about five snakes left following the restocking of a nearly extinct population reduced to three individuals of the same sex. One comprises the remaining adders from a release of around fifty at a large, mainly grassland site. The fifth is a high density population resulting from the release of a few gravid adders that live in just a few hectares of heathland surrounded by fairly busy roads and woodland. At least four of the populations have good future prospects given habitat protection and creation/restoration in the vicinity, together with other measures. This represents and is likely to be a considerable improvement from the situation reported by the first author (TESL) in 1991 when only two sites were known and both tiny and barely viable. The adder in Greater London may have been saved from extinction in the short term, but still has a long way to recover.

Just outside the Greater London boundary, adder survival moves from being tenuous to a position where there are places where small and viable (but nevertheless threatened) populations have been recorded. Some of these, associated with records just inside the Greater London boundaries, suggest that they were once continuous.

Historic and present-day adder status is described here further by county, the county in this respect being the area outside Greater London that is positioned usually either side of the circular LNHS boundary and within this study area. Figure 4 shows the approximate location of the twenty-three remaining adder 'sites' currently extant within the LNHS area. Most sites are single populations located in a small area of less than five hectares of habitat and are populations of less than a hundred individuals. The total numbers of adders remaining is guesstimated at between 500 and 1,500 individuals. Records have been displaced to protect exact locations.

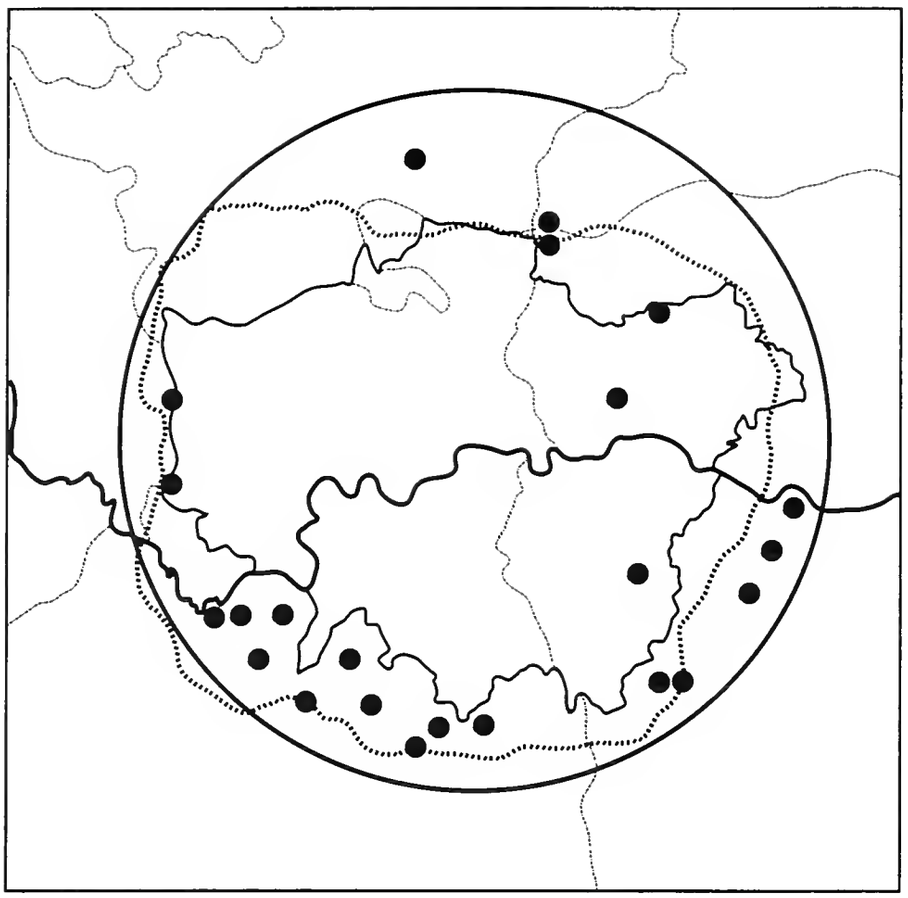

FIGURE 4. Approximate location of the 23 known remaining adder 'sites' (see text), currently extant within the LNHS area. Records have been displaced by up to 8 km to protect locations.

Hertfordshire (only one remaining population of possible natural origin)

The adder has long been reported as absent from Hertfordshire. J. W. Steward for example concluded that there were no authenticated records from Hertfordshire (in litt. to LNHS). There has been a recorded introduction from Essex at Mardley Heath near Welwyn in the late 1960s that does not seem to have survived. A small population however is reported to exist today within the LNHS area that appears to be of old origin because of reports that adders were also present there from the 1880s game records in Lord Salisbury's diaries. A more recent anecdotal claim of two gardeners being bitten by adders and of a horse dying after an adder bite are interesting; the use of adder scare stories to keep people away is always a possible factor.

Within the Herts. part of the study area, Clark (2001) states that there have been adder bites to humans in the 1990s, including a child near Hertford and an adult near Welwyn Garden City although a definite sighting of adders or specimen does not exist. The reference to Piers Shonks as an eleventh century serpent killer is considered erroneous as it appears to be almost completely based upon mythology (Westwood 1985).

There does appear to have been a more extensive adder distribution in north Hertfordshire but it seems likely that there is just a few, and possibly just one further remaining adder population in the county. In common with counties to the north of London, e.g. Cambridgeshire and Nottinghamshire (Wright et al. 2004), and several other English counties, the adder moves measurably closer to extinction.

Essex (scattered localities but declining)

There are early accounts that adders are found in dry sandy places in the northern parts of the forest (Cooke 1893) and Cooke also mentions in passing with respect to Essex that 'adders abound on our sea walls but they are much

rarer now of late years'. An early LNHS record is from the Tilbury Docks area in 1946 (source *The Listener*), and the docks and industrial land around Tilbury has old quarry areas, sea walls and a diverse range of post-industrial habitats that are now under commercial development as a part of the 'Thames Gateway'. The grassy alluvial soils seem to provide a refuge for adders and the remoteness some protection from persecution. Laver (1898 in Clark (2001)) reports adder as 'common in woods throughout Essex but is most frequent in the Marshes. I do not think it is so plentiful as it used to be before the large hedgerows were reduced in size.'

Epping Forest covers around 2,430 hectares (6,000 acres) of woodland with grassland on neutral soils and grass and heather heath on the acid sands and gravels. It lies on a roughly 10 km long by 2 km wide linear outcrop of Claygate, Bagshot and Older Head sands and gravels, and is probably the most referenced adder site in the review area (see Table 1, and Boulenger 1895, Cooke 1893, Dent 1914 in Fitter 1949, Buxton 1915, Fitter 1949, Stubbs 1920, Dent 1924, Malenoir 1963, Malenoir and Pickett 1968, Pickett 1986, Wheeler et al. 1959). To the south and east of Epping further sandy outcrops occur as islands in the London and Glacial Clay, generally increasing in size at the edge of the study area around the sides of expanding Essex towns. Adders here are known to remain in small enclaves in country parks, abandoned 'plotland' areas and other localities where perhaps adders regained numbers in recent decades at least until the scrub became woodland and road and housing developments accelerated from the 1970s. Scattered records of individual adders suggest that the final stages of extinction are still being played out in some areas although in others road embankments have perpetuated open sunny habitat for adder. Adders in Epping Forest have survived against the odds. Stubbs (1920) wrote 'I think their entire extinction is but a few years' distant'. Restocking and habitat management by a few dedicated workers over the decades has increasingly been taken over by official interest in recent years.

TABLE 1. Past adder distribution in Epping Forest, from Pickett (1986) and other sources.

Dates	Location	Source/details
Post-1980	Uncertain	Adders 'rescued' from Burnham Beeches and Essex
Pre-1939	Lower Goldings Pond, Sandpit Plain and Baldwins Hill area	John Davidson
Pre-1939	Furze Ground	John Davidson from D. Scott
Not known	Rushey Plain	Introduced
1958	Wake Valley Plain	
1958 and 1986	Birch Wood	6–8 adders seen in 1986, hundreds in 1960s
1960s	Broadstrood	Adders common in 1960s
1960s	Whitehouse Plain	Record from D. Scott
1958, 1986	Long Running /Jacks Hill	'Good and stable' numbers in 1986
1950s, 1960s, 1986	Deershelter Plain	Large population in 1950s and 1960s

Surrey (one of the few English strongholds, but continued decline)

For much of the last two hundred years, Surrey heathland has been used by the British army who own around two thirds of Surrey's heathland. This has protected land to an extent, from urban spread. Older LNHS records for Surrey include Oxshott, Headley Heath, Chertsey/St Anns Hill, and these are all on Claygate, Bagshot and Bracklesham sands. Those from just outside the LNHS area include Esher, West End Common, and Chobham Common, on Bagshot and Bracklesham sands and on chalk near Merrow, Clandon, Box Hill and Ranmore. There is also an old record from Tatsfield Hill (Palmer, in Cooke 1893). Close to London, just outside and within the LNHS area some of the historic sites are now extinct and others at perilously low numbers. West of the 95 Ordnance Survey easting however, adder numbers are more consolidated as the core area of reptile distribution in Surrey begins (KFC pers. obs.).

At some of the major road junctions around the M25 in Surrey there are perfect heathland conditions for reptiles on the heather-clad Bagshot sand and Terrace gravel hills. At one location on the north-west side of the road, occasional adders have been seen but much of the heathland is neglected and degraded. No adders are known from the north-east side although reports from M25 highway surveyors suggest they may now be using the north side's south-facing embankments. To the south side of the junction, both east and west sides had grass snake, common lizard and slow-worm and while the south-west side had a few adder records the south-east had many more. Public pressure was highest nearest to the M25 junction. To the south-east, the slopes once supported one of the densest natural 'colonies' ever seen (by KFC). Since then, there has been major tree clearance and leaf litter scraping of the surrounds and an increase of heathland habitat. Horse-riding has increased in the area and disturbs habitat, otherwise it would be perfect.

Kent (severe declines, several small populations remain)

At the south-east edge of the study area in north-west Kent, adder distribution is all but restricted to two main areas. The first comprises locations that fall within a few kilometres of the River Darent. This flows north from Westerham to Dartford and into the Thames between the Crayford and Dartford marshes, just a few kilometres inside the LNHS boundary. It has been well surveyed by LNHS members and others over the past fifty years. As it travels from Westerham to Dunton Green, past Otford, Eynsford, Shoreham, Farningham and Bean the countryside has several adder records old and new particularly on downland localities, described as grassy hillsides often with hawthorn scrub or bordering woodland and on Upper and Middle Chalk soils. Most adder sites appear to have been more extensive. Older records for example, exist from Shoreham recreation ground where in 1962 a fifteen year old boy was bitten (source *Sevenoaks News*) and from 1960 at Farningham Wood on the Blackheath and Woolwich sands where they are apparently no longer present.

Slightly further east LNHS records are from land around West Kingsdown on Upper and Lower Chalk and Flood Plain Gravel. A second area of adder distribution follows Pilgrims Way along the chalk ridge in the Wrotham area and at scattered locations north to Meopham and south, through Offham to Mereworth, West Malling and Peckham Place.

Buckinghamshire, Bedfordshire and Berkshire (all counties with small numbers of declining adder populations)

One record from Ashridge in Bucks. (Clark 2001) near to the Herts. border has little detail. The record from Langley in Berkshire from the 'ground of house' may have resulted from a release.

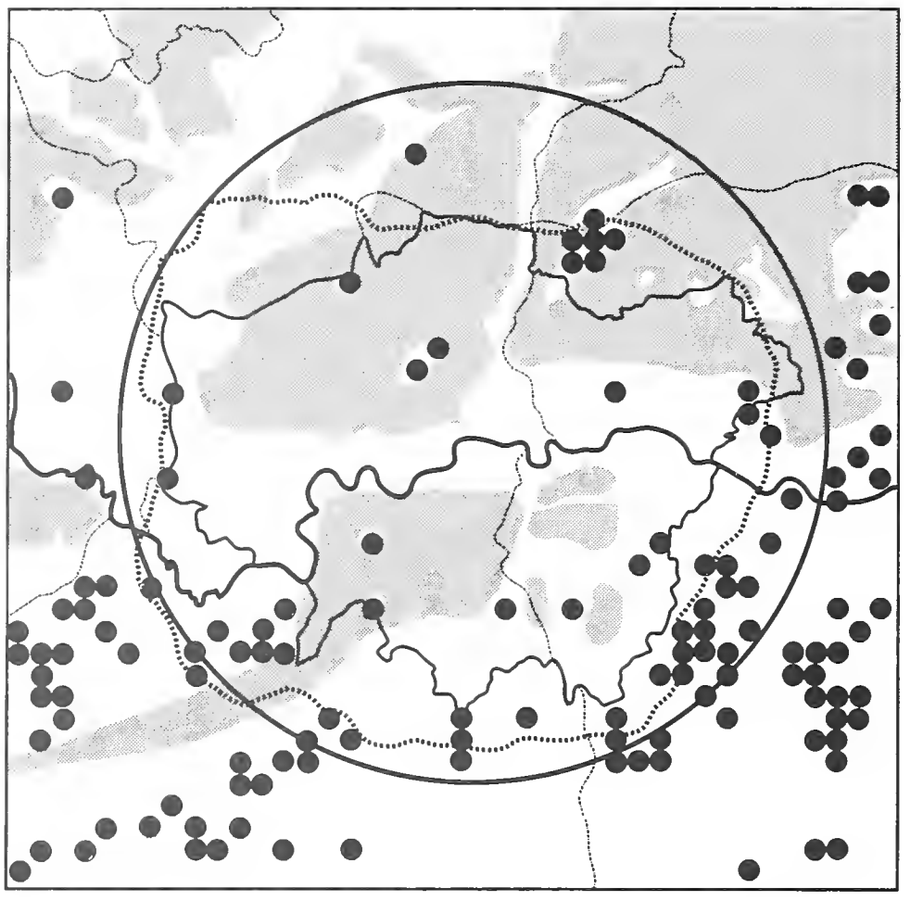

FIGURE 5. Adders in and around London: all records post-1800. Recorded distribution of adders is shown at the tetrad level. Extant tetrad records have been displaced by up to 8 km to protect locations. The approximate position of clay soils and clay-dominated areas (shaded) including London Clay, clay with flint and boulder clay, showing absence of adder records other than on a few sandy outcrops within the clay.

Conservation, legislation and protective actions

Conventions and domestic legislation

London's adders, as with all other adders within the Council of Europe area, have been protected since 1979 by the Berne Convention. Under Article 8 of this convention, for species like the adder on Appendix 3, governments must 'prohibit the use of all means capable of causing local disappearance of, or serious disturbance to, populations of a species'. This includes not only controlling capture and killing, but all activities capable of causing local extinction.

The Berne Convention was always ahead of its time for reptile conservation value and contracting parties have in general struggled to drag domestic legislation up to the mark, let alone to implement it for many species. Nevertheless it has drawn attention to the lack of progress in decline of more sensitive vertebrates. In Britain, rare species conservation has been advanced, at least to some degree by the Berne Convention. Many of the Convention's Appendix 3 species have not fared so well and some have been almost fully neglected. This is often because the ability of the Convention to police inadequate standards is limited. Formal infraction procedures can be long-winded, readily sabotaged and ultimately hard to enforce. Potential for Berne to help bring resources to situations such as the adder in London and England in general, nevertheless still exists.

Biodiversity Action Planning began in the mid 1990s. It attempted to rebrand UK conservation effort using government agency lead habitat and species provisions. The listing of commoner declining species, including the adder as a lower priority than the first priority group has meant that it is only recently that effort has begun to trickle down with local initiatives. The approach has not yet benefited adder conservation in London although the

potential remains. The gap between the attention given to strictly protected species and the others is therefore growing and it is clear that in some cases the plight of non-protected species is overtaking that of protected species, with the adder becoming extinct or very close to extinction in several counties over the last decade. Nevertheless there have been some gains from Habitat Action Plans (HAPs); National Plans include those for Lowland Heathland, Lowland Dry Acid Grassland, and Lowland Calcareous Grassland. Greater London HAPs include those for heathland, chalk grassland, wasteland, acid grassland, churchyards and cemeteries, railway linesides, ponds, lakes and reservoirs and private gardens. In Greater London four of the remaining adder sites have recently been subject to a review of their management needs as a result of the local BAP (London Biodiversity Partnership 2004).

A Heathland Heritage project however, is funded by the Heritage Lottery Fund and a consortium of other partners, to front the EN-led national Lowland Heathland Biodiversity Action Plan (BAP) targets of restoring 58,000 hectares and re-creating a further 6,000 hectares in England. This in turn contributes to the overall UK BAP. Through habitat restoration the project aims to recreate 110 hectares and restore around 2,500 hectares of heathland. This will be implemented with the help of local authorities and voluntary organizations. Other plans exist for chalk grassland.

Unfortunately however, in many cases, according to some observers in the field, such management is over-simplified and without adequate understanding of the plant and animal community present, with management requirements too often ignoring any considerations towards the structure of ground cover, and hence to the detriment of species such as the adder.

With respect to legal protection for adders, in 1984, Sir David Price MP called in the House of Commons for the eradication of adders, with the reported aim to protect 'children and animals'. In a subsequent report on persecution of herpetofauna (Langton 1986) it was pointed out that in the mid 1980s reptiles were being openly killed by the public. People were killing snakes and slow-worms in case they were harmful and often giving the view that even if they were protected 'on paper' it was highly unlikely that anyone would be prosecuted. The 1986 report had included examples from this study area; including the London boroughs, Burnham Beeches in Buckinghamshire and several other sites in Surrey, one of the counties where particular effort for reptile conservation had been concentrated by the British Herpetological Society from the late 1960s to the late 1980s. Adder was partly listed under Schedule 5 of the Wildlife and Countryside Act (1981) in March 1991, making the killing or injury of adders unlawful. This followed representations from voluntary bodies concerning its decline, and in 1990 objections in the House of Lords to its prospective protection.

Protective legislation then triggered the need to protect adders during development work, including translocation of them when adder sites became under threat. This brought with it measures that in practice were close to the level of protection afforded to fully protected species but through protecting the animal and its requirements and not its occupied habitat *per se*, although the distinction is very fine.

Site protection and management

Protective actions for nature conservation benefit have been made since the mid 1800s in Britain but in particular after the 1940s in Greater London and across the LNHS area (Hewlett 2004). These areas have, by chance included several extant adder populations, and some places where they have since either died out, been persecuted or have held on until today, in small numbers. Government has struggled with adder conservation in the past, partly because adders biting gundogs and feeding on ground-nesting bird chicks and have been considered as 'pests' to commercial shooting interests rearing grouse and

other 'game bird' for sport. The Nature Conservancy Council and English Nature have, beyond designation of Local Nature Reserves (LNRs), Sites of Special Scientific Interest (SSSIs), National Nature Reserves (NNRs), and European (SPA/SAC) sites, part-funded low levels of national supporting conservation inititatives for adder, while the species has also benefited from local management schemes for other reptiles, particularly in Surrey. Sadly, on at least one NNR adder protection has been regrettably less than a priority following designation.

Establishing National Nature Reserves and Sites of Special Scientific Interest has no doubt benefited adders on the wider scale via habitat protection, while at the site scale, management activities such as rabbit warren gassing, bracken and scrub/grassland flailing, heavy grazing and insensitive scrub removal have too often been carried out in a manner than has disadvantaged adders and even caused their local extinction.

More recently and at the local government level, many site management activities both on and off County Wildlife Sites (CWS, also known as SINCs, or SNCIs) and country parks have been broadly sympathetic with the County Councils of Surrey, Essex, Kent, Buckinghamshire and Berkshire funding adder conservation to varying degrees within the context of general site management.

Over the last twenty years in Greater London five London boroughs have had responsibilities for adders and in most of them the challenge to protect adders has been realized at least to some degree over the last ten years or so with positive action taken at a local level. The difficulty for those working on the ground to achieve specific measures is in part due to the reluctance of councils to be seen by the public to be protecting a venomous snake. This is an area where legislation may be essential to overcome the remaining barriers and not just to release resources. Obstacles include not only carrying out work more or less in secret to prevent antagonistic individuals finding and killing snakes, but difficulties such as explaining why encroaching/over-shading by trees means that they must be cut down, within places some feel should be allowed to 'grow wild'. One example of this in the mid 1990s included one of the remaining Greater London sites during habitat work to recover an adder population that had suffered snake killing by the public for decades. The matter was discussed within their Council but was considered to be too controversial for public funding and beyond the scope of their reserve management even though it was becoming a SSSI. It was made clear that a formal project would be very difficult to carry out and could not be funded by the Council at that time.

The issue of site secrecy and confidentiality has been, as with badgers a significant factor in recent years. With badger, a species also vulnerable to persecution, better protection and experience gained by badger groups and the police and RSPCA in dealing with crime against badgers has resulted in many areas with sett existence being not kept with levels of secrecy previously thought essential, on the basis that any damage done and claimed 'in ignorance' of badger occupation in some cases would be less of a defence to the offender. The same might apply to adders, only they are far less able to recolonize than badgers, their numbers are low and distribution is more fragmented. In contrast to badger digging, they are simple and quick to kill and evidence may be hard to find, thus this reasoning does not apply. This is the main reason why adder information has been kept away from public records as much as possible, as one way to undermine a conservation effort at present would be to allow the last few sites to become widely known.

The Corporation of London controls small but significant adder areas in Epping Forest in Essex and at Burnham Beeches in Bucks. where isolated adder populations remain. At Epping the sites have become increasingly wooded in recent decades and a range of individuals have supported specialist

management efforts to keep sufficient habitat open. Today in spring around twenty adders can be seen basking across a few remaining areas, so the population is probably under a hundred individuals. Burnham Beeches has around 219 hectares (540 acres) of mainly ancient woodland. Although adders occur across about ten hectares or more of open habitats, they appear to have moved away from the dry heathland component that had been subject to insensitive habitat 'restoration' effort and are now particularly located in the boggy and wetter mire areas (M. Hartup pers. comm.). The fragile population is likely to be under fifty adult individuals.

Voluntary bodies

Across Greater London there has been little coordinated activity beyond that of LEHART who have written site management briefs for four populations, carried out monitoring at two sites and intervened when sites were under threat. A number of individuals with experience in reptile protection, management and translocation have been involved in restocking/reintroduction work that has been carried out on a confidential basis since the mid 1980s due to the range of sensitivities involved.

In Surrey, the protection of adders has been achieved at many sites through the protection of dry lowland heathland by a range of organizations. Much of the remaining heathland is SSSI or managed as reserve area. In recent years under the Surrey Heathland Project, The Surrey Wildlife Trust carries out (through a trading company) habitat management on behalf of Surrey County Council.

From the early 1970s The British Herpetological Society (BHS) managed, through its Conservation Committee (BHSCC) and with the support of WWF-UK, a series of Surrey sites under management agreements until formal SSSI designations began to give further protection. Site management involving work parties carrying out removal of invading pine trees and scrub control safeguarded a number of key areas for rare and common species. From 1989 The Herpetological Conservation Trust (HCT) and others have ensured that reptile management was not overlooked, and campaigned vigorously against misuses of burning, poorly coordinated grazing and other threats. HCT reserves past and present include currently around a dozen sites in the Surrey part of the survey area and many outside and beyond it in south Surrey and Hampshire.

In Essex an amphibian and reptile group has been established with the help of Froglife and active volunteers make call-outs to adders reported injured, killed or trapped or otherwise causing concern and to investigate possible new adder localities. Volunteers have for many decades been involved in adder monitoring and management in parts of Epping Forest (e.g. Pickett 1986).

Although only briefly mentioned in Kent's 1998 Biodiversity Action Plan (BAP), concerns over the adder's status convinced the Kent Reptile and Amphibian Group (KRAG), that the snake should be highlighted in Kent's *Red Data Book*. The adder is referenced in the Kent BAP as a 'Standard Bearer/Quality Indicator Species' for heathland and mire and lowland acid grassland. Adder however, is not mentioned in BAP habitats from which the animal is most commonly recorded in Kent. KRAG believes that in Kent population declines are real (KRAG website) and launched an 'Adders in Decline' initiative in 2004. In 2005 the project aims are to promote proactive conservation of adder through the following actions: recording the distribution of adders in Kent — in particular, through identifying Key Sites and important habitat components within each site (e.g. hibernacula); monitoring important populations; raising awareness and publicizing apparent declines; running reptile survey training events; and publishing habitat management leaflets.

Most of the Wildlife Trusts in the study area have several reserves with potential for adder and there are some where adder management has been overlooked and there is unfulfilled potential. Other reserves have been

established and are controlled by The National Trust and the Royal Society for the Protection of Birds (RSPB).

Education and training

Most people accept that nature conservation needs to be done but are unable or do not feel the need fully to understand the process. Acceptance of the need may be easier in countries where large areas are protected. In many countries formal protected nature reserves are not small and dotted within the living areas of humans as they are in England. In England, despite continued efforts, many people have become largely disconnected from intimate contact with wildlife in their busy urban or rural lifestyles.

Snakes, like spiders and rats, suffer from an image of being harmful and bad, and are amongst the most disliked minority group of the animal kingdom. In the last Gulf war the Anglo-American PR effort referred to the Iraqi resistance as being like 'a nest of vipers . . . to be decapitated' (source: *The Times*) while the Iraqi PR response was that the invading convoys of tanks and troops would be 'cut up into pieces like a boa snake' (source: live broadcast, Sky News). At a time of war it was snakes that were used as the antipathy of vitriol.

What chance is there then for the rehabilitation of snakes ? There are few positive images of snakes anywhere; a current exception seems to be the adder-like Missy Hissy in the new Andy Pandy pre-school children's programme. A particularly sad trend since the mid 1990s has been the use of snakes by television programme makers and presenters, catching and grappling with snakes around the world, who do nothing for the rehabilitation of snake imagery, irrespective of what the presenter says. Steve Irwin, the experienced Australian reptile handler, with extraordinary catching abilities has had his strong conservation message diluted by a range of imitators. The pressing of celebrities to carry out facile game shows where they come into close contact with harmless snakes and other animals in situations made to appear dangerous is also truly regrettable and an educational step backwards. Television appears to have gone some way to replace religion in the perpetuation of negative imagery of snakes and those who commission such TV programmes to be made are responsible.

With respect to positive snake PR, the Conservation Committee of the British Herpetological Society took a lead in producing the first snake leaflet designed for the public, pleading for greater respect for snakes. A five-year (1984–8) herpetofauna programme of the Fauna and Flora Preservation Society (FFPS, now Fauna and Flora International, FFI) included a 'Snakes Campaign' with information sheets, 'Be Kind To Snakes' stickers and a range of responsive site-based activities, including emergency site inspections and advisory service for habitat management in support of local interest around the UK. Being based in London, FFPS was able to cover some of the London boroughs. Possibly the most valued action for members of the public was the ability to travel out immediately to rescue snakes or slow-worms from often imminent death and to advise on the law and safe release of trapped or injured reptiles to appropriate sites. In many cases RSPCA advice was followed up to make suitable arrangements or to otherwise advise. Similar work began in Surrey and Sussex and throughout that period BHSCC volunteers and now The Herpetological Conservation Trust staff, have continued their efforts to engage and educate the public, particularly in Surrey and at county and local shows and events.

From 1989 the FFPS work was passed to the non-profit organization Herpetofauna Conservation International (in 1995 renamed Froglife), established and funded in its early years by the consultancy Herpetofauna Consultants International (see below). Froglife's work has included leading and providing training courses and giving general advice to local authority and

parks rangers. A successful campaign was run to persuade English Nature to drop the use of its 'Beware Adders' nature reserve signs. A recent study with EN better documented the decline of adder (Baker et al. 2003). The old fashioned and usually home-made 'Beware Adders' warning signs to reduce adder bite and deter trespass perpetuates anti-adder snake feelings and undermined their protection. Until 1999 a comprehensive programme of activities was built up in Britain, directly through special initiatives and via the Herpetofauna Groups of Britain and Ireland initiative of which the London Amphibian and Reptile Group (now LEHART) was a major contributor. Froglife activities included mass production and distribution of advice sheets and a 'Which Snake Is It?' poster, supported by a range of organizations. Since 1995 over 30,000 copies have been printed and circulated. The poster concentrated on emphasizing features that separated the species and has proved very popular with police forces, RSPCA officials and veterinary surgeries. A Field Studies Council herpetofauna identification sheet and conservation training course was designed in the late 1990s, all these contributing to the potential for adder conservation across the study area, and FSC courses are now held regularly in Essex and Kent. In addition Froglife and others have tried to react promptly to counter misinformation or alarmist attitudes in the media. Froglife have produced a range of advisory leaflets such as *Snakes need friends* (1995) and English Nature have produced *Facts about reptiles* (1991) and *Reptiles: guidelines for developers* (2004).

Survey and monitoring

Survey and monitoring activities have been localized and uncoordinated across the area to date. The London Natural History Society survey effort has been largely made as ad hoc records while people were looking for other species. Local efforts have been in some cases very thorough (BHS/HCT) but again with adder not usually the main target species. Many field records have been lost or discarded for the considered priority of resourcing the recording of more nationally endangered herpetofauna. The natural history societies and field clubs have covered their areas fairly well and local record reviews have been published (Essex BRC 1983, Philp 1998). More recently ARGs have become established and are at various stages of producing data bases and mapping atlases. Surrey ARG produced an atlas in 2001 and one for Greater London is on LBAP target for 2007. Also over the last fifteen years, local authorities and retained consultancies have carried out local monitoring. In Greater London English Nature have recently funded small-scale searches of sites with old or recent reports of sightings in the hope of locating adders but, perhaps not surprisingly to date none have been found.

Consultancies

There has been general suspicion of the legislation-driven consultancy process by the voluntary sector after the Wildlife and Countryside Act was past in 1981, and a lack of procedure in government to set and maintain adequate standards and controls. From the late 1980s the activities of consultants began supplementing the previous traditional conservation volunteers and voluntary body/government activities with respect to protected species. In the early 1990s, with the protection of the four more widespread reptile species in Britain, interest has grown in a similar manner to bat, badger and great crested newt consultancy amongst others, and over the last ten years a market valued at an estimated £2 million per year has developed. Today probably 80 per cent or more of reptile survey work is handled by consultants. Some have imaginatively retained all rights to records made once a commercial project is completed and this is to be encouraged as records are often otherwise archived and lost.

The first specialist herpetofauna company established in 1989 was Herpetofauna Consultants International. In 1992, a west London borough council contracted HCI to carry out a range of measures to protect the reptile interest at a sandy heathland/ancient woodland site during the laying of a water pipeline across the key area by the local water company. Following considerations the pipeline route was diverted from the most disruptive route for adders that was through the core reptile area, to a route that travelled across less critical habitat, and so the impact of trench digging and pipe laying were greatly reduced. Field workers were on site during the work to monitor activities and adder and grass snake were recorded in the same places before and after work, in the core area closest to the work, and with no apparent impact on them. In 1994 post-construction monitoring work was carried out from March to May 1994 using small disguised metal refugia to attract reptiles for identification. A report on management and further survey recommendations were made by HCI for the council to take forward and a field meeting was held to go over the recommendations which included keeping the open matrix of grassland and scrub and carrying out survey elsewhere on the site to ensure that adders had not been overlooked.

The document *Adders and the Law* was produced by HCI as a training aid during a training workshop tour around Britain in 1994/5 (HCI 1994*b*). This included a training session in London by Tom Langton and Guy James Solicitors in an attempt to improve understanding of adder legal and technical issues and to enable better understanding of the provisions towards adders in law. Training included the basic aspects of following up a request for help with adders, the safe handling of adders and casework requirements. Training was offered as a basic one-day course with an advanced-level handling course and tailored courses for special groups. The work was adapted by Froglife (see Adders in Amphibian and Reptile Group Casework: notes produced for the Herpetofauna Groups of Britain and Ireland, 1998) and there is plenty of need and scope to extend this work.

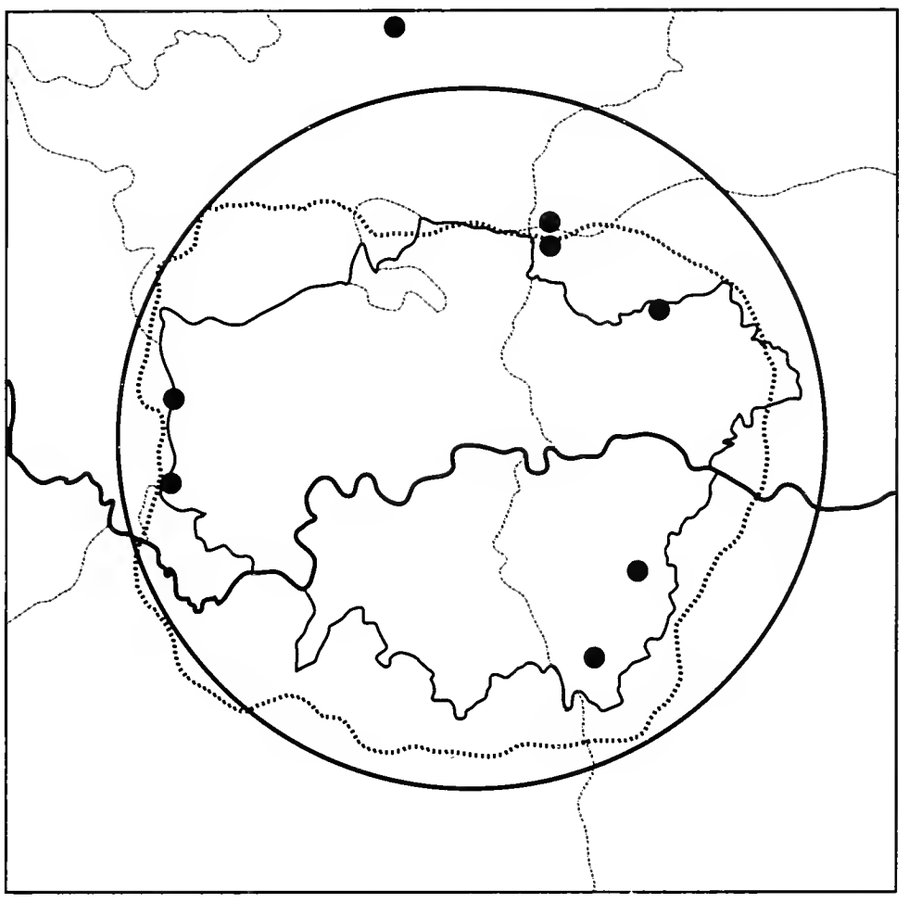

FIGURE 6. Location of reported adder releases since 1940 (reintroduction, introduction or restocking), 1940 to present. Records have been displaced by up to 8 km to protect locations.

Species management

Work to try to bolster adder survival in Greater London and a few places beyond appears to have been realized as early as the 1940s but it was not until the late 1980s that more coordinated releases of adders began. In its natural state in Greater London, adders were restricted to two known probable 'natural origin' locations in the late 1980s and considered at the brink of extinction due to the remaining, adders being present in unviable numbers in tiny habitat enclaves. In an effort to prevent extinction or at least to delay it, numbers were supplemented at one site with only three females remaining through initial restocking. At the other site adders were at very low numbers, possibly extinct and two pregnant females were released there. There have been recorded translocations of small numbers (ten individuals or less) of adders to two other sites within Greater London; one of which definitely still remains and is breeding (in 2004) and large numbers of adders to another since the mid 1980s. Releases were carried out between 1987 and 2001. Together with the single new adder site located over the last twenty years this makes a total of five extant adder locations and two sites recently extinct. Table 2 shows basic details of six of the reported translocations of adders since 1940, although several more are likely to have occurred although none that are known to have given rise to establishing a population. Figure 6 indicates approximate locations.

TABLE 2. Details of adder translocations in and around Greater London and LNHS area since 1940.

County/ Site name	Notes	Year/s	Source/published accounts	Comment/further information
Essex Epping 1		1947–1948	Alfred Leutscher released adders, in Fitter (1949)	Release sites undocumented
Essex Epping 2	Moved from Burnham Beeches where they were being persecuted	1950s	Pers obs. Anon.	Female adder also released from Rochford to Long Running
Essex Epping 3		Not known	Fred Speakman in Pickett (1986)	Release sites undocumented
Kent East London borough 2	Dry heathland and woodland. Two gravid females released	1985	Pers. obs. Keith Corbett	Good survival rate, population now dense
Surrey East London borough 3	Chalk grassland. Up to 20 individuals released from 'doomed' sites in Dorset	1985	Pers. obs. Tom Langton & Keith Corbett	Last record in early 1990s
Essex East London borough 1	Numbers released from Dorset stock collected from large road works site	1999	Pers. obs. Tom Langton	Recent breeding records
Middlesex West London borough 2	Acid grassland and some small areas of heather. Adders translocated from development area at Queen Wood golf course in Surrey: 46 individuals released inc. pregnant females	2000	Pers. obs. Chris Slack & Doug Napier. Breeding reported in 2004	Have spread to adjoining railway and golf course land

Urgent conservation action needed

Strategic considerations

The administrative basis for adder conservation needs to be further established as the remaining adders at London's edge cross many administrative boundaries and involve dozens of organizations and several government regions. Sites within Greater London relate historically and in terms of natural areas (EN Natural Areas) and habitat and species management, to those outside and need to be considered as a whole. Appropriate conservation zonation, carried forward in more detail can inform decisions on transfer of animals for genetic health and assist site managers with issues in common to keep in touch. The 'London North West' zone covers several quite isolated sites between which natural adder movements are almost impossible. Most of the 'London Essex' sites will have had recent natural contact with each other and those elsewhere in south Essex. Although clustered, most are barely in contact with each other but still best taken as a group. Adder movements across the Thames between Essex and Kent seems highly unlikely but as a chance event is still just possible as populations are still relatively close to the river edge. The Surrey adder distribution increasingly fragments as it approaches London and is probably the area where further survey work would be most extensive. 'London Surrey' adder distribution along sand, alluvium and chalk geology joins up to some degree with 'London Kent' distributions but has been frequently interrupted and the Surrey and Kent distributions might best be considered as separate but touching. Remaining Surrey and Kent sites are fragmented but clustered. They can be approached according to each cluster that sometimes relate further afield to their counties' adder distributions, where adder distribution continues into adjoining counties such as Sussex and Berkshire. An attempt to recover adders in and around the edge of London as a whole however would best be initiated with a working area that includes the land inside and a few kilometres outside the M25 as a strategic zone that links together what are effectively the remains of biogeographic zones, that as a whole relate to London. A suitable over-arching conservation zonation is coincidentely more or less that of the LNHS recording area (twenty miles from St Paul's Cathederal), with a few minor variations and this is one reason why the Society's herpetofauna recorders have been given a useful all round overview of a problem that is extreme at the centre of London and that has slowly been spreading outwards for decades.

Regional adder conservation activity needs to involve site owners and managers, be planned from analysis of both collective and individual problems at each site, with clear phasing and monitoring towards favourable outcomes. This is subtly different from an approach that seeks to facilitate communication between those wishing to play a role in helping to improve the situation, as a voluntary approach may be slow, disjointed and not fully engage significant players or adequately access funding. Only by concerted conservation effort with detailed delivery on the ground, will adders stand a chance of recovery and survival.

Site and species protection

Open spaces seem generally prone to ever increasing recreational use, bringing more people into adder areas and so counter-measures to the pressures they bring need to be designed for each location. These have, at a few locations brought diversion of formal footpaths and 'desire lines', construction of appropriate features such as hedges and fences to divert public access and regular site patrols on weekends and bank holidays to monitor protection and look for problems developing. Particular interest needs to be taken in enlarging

suitable adder habitat and controlling public pressure. From within the Greater London (GL) area, the situation for adders as a whole appears desperate, but within a wider geographic area GL sites can realistically still have an important role in local distribution. Good potential exists at many of the sites, including two of the GL sites that have been reviewed recently by LEHART.

Further effort for reptiles including adders, can be made in respect of road and railway embankments including cuttings, sidings and marshalling yards. London's roads and railway lines are bordered by semi-natural habitats that are often of particular value to reptiles. The reason for this is that they are frequently sloped, either as cuttings or embankments. These landforms offer reptiles including adders an advantage when sunbathing or basking, by placing them at an angle to the sun that maximizes surface contact with sunshine, making south-facing slopes particularly attractive to reptiles. Further, on railway 'off track' land they are largely protected from human disturbance, and this is an important factor to animals that can easily be disturbed by human activities. The exclusion of people for safety reasons from railway land benefits wildlife that is prone to human disturbance. They offer some of the few areas with land that is free from regular disturbance by humans in London. Railway line embankments represent about 4,000 hectares of trackside property or around 10 per cent of (non-garden) wildlife habitat within the capital. As there is occasional tree cutting to prevent overgrowth, there is a basic vegetation management system that perpetuates open conditions.

Currently, however there is concern that sufficient resources for adequate adder conservation are unlikely to be made available soon enough or until the priority for adder conservation is increased. Adder conservation would greatly benefit from a national and regional overview that is reliably referenced to regional targets for survival and recovery, e.g. using 'natural areas' and existing, recoverable and creatable habitat as a reference point. Reliance on random samples or lines drawn for administrative convenience will continue to be insufficient.

All of the estimated forty or so remaining adder populations in the study area need protecting and the available statutory mechanism would be full listing under Schedule 5 (currently only partly protected) of the Wildlife and Countryside Act 1981 and subsequent amendments to complementary legislation and as a minimum, the further protection of all adder populations through SSSI or possibly other forms of protected area. There may be alternative regional designations by national government that could also be brought into play under national government department powers.

Habitat management

Perhaps over 75 per cent of the surviving adder populations within the study area are within areas at least partly managed for nature conservation and these have some active management to try to retain natural habitat. While several protected sites have habitat management methods that are excellent or quite sympathetic to reptiles, invertebrates and other species with sensitive microhabitats, most do not, leaving only 25 per cent or so of sites suitably managed. Some heathland sites in Surrey and locally at Epping Forest have received specific adder management since the 1960s while most other sites have instigated adder habitat management over the last fifteen years only. In some cases a combination of imprecise habitat management and increasing recreational visitor pressure have acted to continue the reduction in adder population viability so that many sites are theoretically unviable based upon their fragmented state, the small patch size of habitat remaining and the few numbers of snakes remaining. Even as you leave the outskirts of London, site size does not always increase, as many 'rural' locations are isolated by suburban development, dense conifer forestry plantations, land in intensive agriculture or other barriers to natural dispersal.

Grazing of reptile sites requires further investigation and controls, with monitoring and enforcement of protection if necessary. New management advice needs to be formulated and distributed with in depth training involving experienced reptile site managers.

Public pressure

Public pressure in all its forms needs to be better identified, quantified and thresholds set to guide managers. Public pressure includes just about every activity carried out by recreational human activities, with levels of disturbance and habitat damage ranging from minor and temporary to major long-term damage. Most can be reduced and many eliminated. Some are cheap and relatively straightforward; dog walkers need to keep dogs out of adder areas or at least put dogs on leads. It is important to monitor human activities during the best adder basking periods especially during school holidays and weekends. Use of carefully trained volunteers and CCTV cameras can be considered. Whether it is reduction of the careless trampling by visitors breaking down mature heather bushes or preventing fire lighting in summer, a measured programme of activities needs to be conducted as a part of an annual programme, giving close reference to the timing of movements of adders and factors such as varying weather conditions.

Genetic and population viability

The need for animal populations to comprise five hundred adults to prevent inbreeding is now increasingly considered too low a figure — the numbers should probably be higher because in reality many animals in a population do not play a role in breeding. Effective population sizes of <50 adults give a high risk of inbreeding problems, and even those of >500 have a substantial long-term risk of losing genetic diversity over time by drift. In terms of genetic management however, it is important to be a bit cautious about mixing of populations. Firstly, you have to make sure the populations really are isolated as it can be surprising how much migration goes on. Theoretically it only requires one or a very few effective (i.e. successfully breeding) migrants per generation to remove inbreeding risks. More importantly, there are also potential risks from outbreeding depression when genotypes from populations with different local adaptations, or even just different gene complexes that have arisen by chance, are mixed. There are a few examples of reduced viability in wild populations after mixing incompatible genotypes. The chances of this problem arising with adders is small providing the mixtures were from populations on similar habitats and not too far apart. The strategy might be to restock all populations where it is required immediately to prevent extinction, and at sites where habitat management has been or is about to be carried out. Monitoring allows population size or at least change estimations. As population growth response time is fairly quick, after a decade or so the value of the transfers should begin to be visible and a review could take place. This might require a protocol to examine individuals and to devise a method to judge health, fecundity and other factors. This is a challenge for future managers advised by specialists. Existing sites with imported stock from well outside London might be recipients only of further stock (if it is justified), while very small numbers of the remaining natural populations might eventually be transferred under careful controls between sites and zones, according to a carefully planned process of human-managed transfers or 'genetic rotation'.

This concept needs to be further refined and developed and is another area that requires clear guidelines to be set on scientific grounds, with a move away from the feeling that nature conservation should not be over-prescriptive. A point should be defined where guidelines (that can be revised and updated) form a firm reference point so that those on the ground do not feel that they

are being left to make it up as they go along. Such an approach would require the dedicated attention of experienced conservationists and a strategic framework for implementation across suitably identified habitat areas. This would be best addressed by government.

Survey and monitoring of sites and effectiveness of conservation activities

In the past, broad-based overviews have relied upon questionnaires and the opinions of a few people have informed indices of change across wide areas. While they arguably have some broad-brush value, the shortcomings of such an approach, as species move from being common to rare was recognized in the more advanced central and north European countries in the 1980s, when funding of field surveys to determine actual distributions was heavily promoted. This more precise approach, that is initially expensive in identifying all or nearly all sites/habitat areas using repeatable methods, enables more meaningful further targeting of conservation effort. Identifying all known adder sites is relatively easy on a county basis; they are usually present across less than 10 per cent of a county/under 100 sites. This was the approach used by BHS in 1970s and 1980s in counties including Dorset, Surrey and Hampshire for rare herpetofauna species and for commoner reptiles was piloted in Suffolk in 1990 (Beckett et al. 1990). A Key Sites Register system has been promoted by HGBI (HCIL 1994*a*). For adders this gave three scores for adult counts of adders at sites, less than five seen low, 5–20 good and 20+ exceptional. Since then it has only been held back by lack of funding to coordinate the approach and despite six years of pump-priming support from government. Completing the work and linking it into regional strategies is a considerable undertaking that will require regional centres of coordination by specialists in a manner achieved for other species such as butterflies. The blunt top-down 'give us your data' approach to volunteers from a national 'black hole' office remains as outdated as it was twenty years ago and there are promises of new and better management systems.

Provision of more effective local record centres is happening at the time of writing and it is hoped that with advanced computer technology and appropriate support of specialist recorders, information supply and specialist interpretation and use will be greatly improved and become commonplace. One key to this is training and standardized training courses need to be designed, quality tested and put in place with advice from those with practical field experience in species and habitat management. Workshops of this type have already been run at HGBI annual meetings.

Educational activities

Education is one area where efforts have been minimal and government support of national schemes for local implementation is in need of being revived. These include leaflets, advice sheets, posters, slide packs, training and other support for adder and other reptile conservation work. Most of these have been piloted by voluntary bodies over the last twenty years with a little funding from charitable trusts and funds are needed to rejuvinate activities that are already tested and to design, develop and test new ideas.

Conclusions

From a government perspective, the fact that commoner reptiles such as the adder have been identified nationally for local Biodiversity Action Plan (BAP) attention, combined with the obligations under international treaties means that it is required to take action to reverse the decline of adders, to prevent extinction and to recover the species to an acceptable level in its former range.

To achieve this there is a need for professionals in public bodies to be further trained and funded to take forward specialist species management activities, to enable proactive species conservation to succeed. This goes beyond land managers just responding to public complaints that sites are not being managed properly for declining species. A point needs to be reached where managers of public sites can show leadership in cooperative ventures to stop and reverse adder declines including, where feasible, ambitious habitat restoration and creation projects.

Early signs of progress might be:

- Adder management plans completed and approved for all extant sites within the future conservation (LNHS/M25) area
- Training and interaction for site managers with specialist on-site guidance throughout the year on a long term basis
- Detailed advisory publications distributed to advise managers
- Sustained funding of adder habitat recovery and creation

On the ground, adder conservation starts with sensitive management based upon understanding habitat features and snake migration routes. The application of grazing regimes needs to be rethought for adder sites. The average cost of secondary management to retain open heathland conditions is about two work days (say £200) per hectare every three years using hand tools (M. Preston pers. comm.) and this even undercuts the cost of running and managing animal flocks, with respect to the need to feed, transport, and otherwise to keep them properly and fence them. It is also more energy efficient.

Projects such as the Urban Heaths LIFE Project carried out recently in Dorset should be set up in the study area to provide extra part-time wardens, a Police Heathland and Wildlife Protection Officer and appropriate equipment for the fire and rescue service and awareness through educational activities in schools.

Over time, unconnected small pockets of animals are not viable in themselves and species like adder with limited powers of dispersal in disturbed habitat may suffer as the decades of near total isolation become a century or more. This opens debate as to the level of importance for, and what might be seen as a need to 'interfere' in nature by artificially moving animals in a coordinated way between fragmented sites to maintain genetic health. The instigation might be considered a potential alternative to the ideas of resolving the problem via enlarging or linking sites by joining them up or placing connecting corridors of habitat. There is plenty of scope for debate here. As a short term need, translocation for genetic fitness may be justified but not as a substitute to site enlargement and linking of sites via habitat creation.

If extinction of adders is not to be accepted then the genetic issues need to be addressed as follows. Firstly, it has to be accepted that the movement of adders between isolated sites is going to have to be carried out by humans. This may offer a challenge to nature conservation policy for there are many who would say that maintaining a species in this way is a waste of resources and wrong for a number of reasons, not least that it sets a bad precedent for the future in allowing artificial processes to replace those that should occur naturally and possibly weaken arguments that habitats need to be joined up or kept intact.

Moving small animals for nature conservation purposes has changed from being unheard of by most in the 1950s, to frowned upon by a few when carried out by individuals and consultants from the mid 1980s, to accepted protocol today, albeit in need of better planning and regulation. It is still opposed by some academics and conservationists despite now being a massive and growing activity for rare and common species management around the world. In Britain

the process still needs to be refined and quality controlled and achieving this is the real issue. Movement of rescued adders by consultants has provided stock for three of the six recent Greater London adder sites, and movement by conservationists from 'doomed' sites at least two of the others.

Such measures will be needed relatively soon too for many of the small populations of rarer reptiles: smooth snake *Coronella austriaca*, sand lizard *Lacerta agilis*, and natterjack toad *Bufo calamita*, all now extinct in London although given habitat re-creation over big enough areas, in time their return to London is quite feasible.

Discussion

Adders should not be allowed to go extinct across London because to do so would be to surrender to the helplessness of humans to share their environment other than with animals that are pretty and docile. From a government perspective, the fact that commoner reptiles such as the adder have been identified by the Berne and Biodiversity Conventions, combined with the obligations under domestic law mean that all public bodies are required to take action to help reverse the decline, to prevent extinction and to recover the species to an acceptable level in its former range.

Although there are some signs of improved awareness, the proactive conservation of snakes around the world, other than through creating nature reserves is still a relatively rare event and usually occurs only when their numbers have truly reduced dramatically. Examples include the Orsini's viper *Vipera ursinii rakosiensis* in Austria where a bounty was placed on its head (Corbett 1989) and where belated conservation effort could only confirm their extinction.

In Australia, the USA and Canada there are snake conservation projects in suburban areas, many involving the relocation of venomous snakes away from gardens and private lands, which rarely has net conservation gain from the actions but that can bring about understanding and respect for snake conservation.

It is time to not only give adders full protection in law but also to define parameters for expanding and protecting habitats available to them and providing genetic exchange artificially through translocation. Careful controls will be needed to prevent rapid disease spread and the work will be of limited value to most populations if not accompanied by habitat management.

Actions to conserve adders over the last thirty years has reduced the likelihood of extinction and could continue to hold them on the edge of extinction given continued effort at a few sites but this would be only a token approach to the overall problem. Meaningful recovery of the species would require a determined effort and long-term commitment that could only be galvanized by adequate resourcing and dedicated effort. It will require a sea change in government promotion of nature conservation as the main priority in land use planning over a sufficient area of 'greenspace' and linking corridors, including substantial habitat re-creation and subsidy of land managers impacted when nature conservation-led, land-based economies are locally adjusted. Such an initiative would require a shift of comprehension of nature conservation from being an 'add on' to human activities to being the overarching process within which everyone lives. The level of effort will determine whether adder joins sand lizard, natterjack toad and smooth snake in surviving in just a few isolated enclaves and from there to the history books on London's wildlife.

Like the barn owl *Tyto alba*, the adder is a commonly seen species around large areas of the world. As such it might be considered a yardstick to reflect humans' ability to live alongside widespread species as it takes a fairly determined effort to reduce habitats to a point where these species can no longer persist. Adders are not confined to hard-to-maintain niches but are

capable of adapting to a range of environments and just require tolerance by humans and a bit of habitat management. As such it is a good measure of humans' ability to conserve wildlife — losing them from a county or region is only possible if a nation really is determined not to do anything to protect the species over successive decades and change of governments. Further local extinctions will only happen if nature conservation professionals are powerless to make meaningful changes, or are trained or managed in a way so as not to promote land use change for both fauna and flora effectively.

Adder sites across London must have become naturally fragmented to a degree with climatic deterioration (1650–1850). Adders are limited in their ability to build up fat reserves to breed and in Britain only give birth every other, or every third year. This is common in other north temperate countries. A range of factors suggest that the adder has a naturally fragmented range within the study area north of the Thames and it is only towards the edge of south London that it has been naturally abundant, at least in recent centuries as a result of more suitable geology and habitat.

This natural fragmentation effect may not have helped adder prospects but it does not mean that adder protection is futile, just that the area of remaining habitat, degree of fragmentation and theoretical carrying capacity of remaining sites must be a major factor in adder conservation planning.

Adder conservation work has in many cases been secretive by its nature due to vulnerability of adders to disturbance, collecting and 'adder bashing' and because of legal constraints and public sensitivities in urban areas, where to many, protecting a venomous snake using public funds is still a difficult concept for many. The formal reporting of adder records has to date been kept to a minimum and on a 'need to know' basis because of the threat of attracting adder killers, collectors or those disturbing them for other reasons.

In London, as elsewhere in Britain, adders have faced both habitat loss and fragmentation and persecution by people afraid of the adder's venomous capacity. As the largest UK centre of human occupation for centuries, adders have really stood little chance of permanent occupation in numbers anywhere in Greater London in recent years without assistance. The LNHS review of London's adder distribution in 1991 gave little chance of adder survival in Greater London post-2000 'unless substantial resources are put into its conservation'.

If the conclusion is that protective conventions and legislation has been ineffective, in only slowing and not preventing adder decline then the question is how to change things. Is more legislation needed or do those responsible for lack of implementation need more help ? The main legal mechanism to manage adders is via SSSI designation and hence the Wildlife and Countryside Act Schedule 5 listing (or similar) is essential. In saying that, in the sites that are SSSI, adders are by no means always managed correctly and so special advisors are needed.

A national approach is warranted and it is clear that government agency team managers hardly ever have the specialist resources to hand locally. The Froglife common species coordinator (1993–2000) and other non-government organizations have provided some level of advice but government support has been patchy and a full-time dedicated snake advisor is needed and would be kept busy throughout the year although the effort needs to be sustained long-term, over decades, not just a short duration.

Despite ever increasing land use pressure, there is a need to keep the wilder areas in bigger open spaces in and around London largely undisturbed and to look proactively at ways to expand them and to join them up. Conversion of one of the more bare and featureless Open Spaces to a landmark centre for nature conservation awareness for rare and declining species might help inform the public of what has been lost and how to recover it; both the animals and the sense of understanding and enjoyment that comes with familiarity of them.

There is a further need for new strategic approaches whereby the outer London boroughs work closely with district and county councils on cross-boundary planning and implementation of adder conservation and better standards in protected species conservation. This should include far more refined and comprehensive local enforcement by government agencies and improved interaction with and assistance for police forces that may be involved, as necessary.

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Book review

How to be a bad birdwatcher. To the greater glory of life. Simon Barnes. Short Books, 15 Highbury Terrace. London N5 1UP. 2004. 198 pp. Hardback, £9.99. ISBN 1 904095 95 X.

Many an LNHS member will know the journalistic work of Simon Barnes and whether from *The Times* or in the RSPB magazine *Birds,* his enjoyable style of witty and perceptive writing is well reflected in this very good read. Just to clear up one point which I admit had delayed my reading of the book is that this is not another sub-Oddie guide to cunning birding beyond the pale, a sort of how to get away with tricking all around you while you misidentify species after species.

My advice, though, would be not to sit down and just read from cover to cover as I did the first time. This really is a dip and browse sort of book. On the former approach I began to consider how Simon Barnes has used birdwatching as the paradigm of his life — to explain the relationship with his parents, develop his early life in Streatham, his journalism, especially sporting journalism with the required worldwide travel etc.

But that pretentiousness misses fairly completely his aim of showing firstly how birds came into his life and secondly that bad (as opposed to not) birdwatching is within the grasp of anyone who has realized that there are different sorts of birds and that naming the common ones is not only feasible, repeatable but very enjoyable. It is to stress the habit of looking, of enjoying understanding of the natural world around us and building in the basic knowledge so that when you realize that probable kestrel is indeed the incomparable hobby you are happy indeed!

There are many good stories whether London, Minsmere or further afield, especially in Zambia. But the remarks I liked best are on page 41 and follow the bad birdwatcher realizing that you can indeed tell great tit from blue tit, from coal tit etc., but then the next two — marsh and willow — are virtually identical. 'Really: you make an effort to like birds and right at the start, they throw a curve ball like that at you. It's the rank ingratitude of it all that gets to you. The only thing for a bad birdwatcher to do at this sensitive stage of development is to ignore it, in the most tactful way possible. Acknowledge the presence of the marsh or willow tit, but don't let it upset you. The point is that even so early in birding life, you meet an unfathomable mystery. And if we are not here for unfathomable mysteries, then what is the point of life?'

So, if you know a potential birdwatcher who needs a present, this book will be an excellent gift except, of course, that they may start to ask more difficult questions as their quest begins.

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Aquatic invertebrate surveys of the Inner Thames Marshes SSSI, 1998–2001

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Summary

This paper summarizes records for aquatic and wetland invertebrates obtained during Environment Agency surveys of the main-river drains, smaller ditches and standing waters of the 479-ha Inner Thames Marshes SSSI, including marshes at Aveley, Wennington and Rainham. Eighty sites were sampled during mid June 1998, prior to the opening of the new A13 Rainham Bypass which crosses the site. A second survey of Rainham Marsh in mid July 2001 included repeat sampling of fifteen sites.

These surveys confirmed that the marshes continued to support the important invertebrate fauna noted by Nature Conservancy Council surveys in the late 1980s and early 1990s, despite fears that low water tables and a neglect of management in the intervening years had degraded habitats across the SSSI. Only three previously recorded species afforded nationally scarce (Notable) or higher status were not found during 1998 to 2001. However, there was evidence that the distribution of the scarce emerald damselfly *Lestes dryas* had contracted significantly since the late 1980s and was probably lost from Rainham Marsh in the early 1990s drought. This paper provides new records for the SSSI for two RDB species and eleven others that are nationally scarce (including two within category A). The two surveys recorded over 260 taxa overall, including around 205 that are regarded as fully aquatic. Records for four *Red Data Book* and thirty-four nationally scarce species (including three that are category A) were obtained.

Variations in the richness and composition of assemblages occurred within each marsh, sometimes between sites in close proximity. The individual sites producing the greatest component of nationally scarce or rare water beetles, a significant element of the conservation importance of the SSSI, were open, shallow, semi-permanent areas of standing water with vegetation dominated by low-growing sedges, club rush or grasses. Halophilous (salt-loving) coastal invertebrates occurred widely and were particularly associated with saline outfalls from bunded silt lagoons and an area of reedmarsh to the south of the Thames flood embankment at Wennington. These locations yielded fewer species compared to the deeper, freshwater, perennial main-river drains, but contributed to the overall biodiversity of the SSSI.

Introduction

The Aveley, Wennington and Rainham marshes form the 479-hectare Inner Thames Marshes SSSI situated on the north bank of the Thames Estuary about five miles east of central London. The marshes are the second largest SSSI within Greater London (after Richmond Park) and the largest expanse of wetland bordering the upper reaches of the Thames Estuary. The SSSI comprises a major relic of grazing marsh and waterlogged ground that is

divided into blocks by bunded silt lagoons and dissected by a complex ditch network totalling around 20 kilometres (12 miles) in length.

Until the 1980s most of the site was an active MOD firing range. Grazing by sheep or cattle was used to maintain open, short, tussocky grassland at Wennington and Aveley (the Purfleet Rifle Ranges) and this persisted until the mid 1990s. At Rainham, grazing had ceased by the late 1970s when the area used for the Rainham Rifle Ranges was sold to Havering Council by the MOD. This resulted in a contrasting taller grassland structure, and by 1998 parts of this marsh had become invaded by scrub and tall rank vegetation. Accessible areas were also prone to fly-tipping and off-road motorcycling. During the droughts of 1990–2 and 1996–7 most of the standing water across the SSSI, except for the deeper main-river drains, dried-out for extended periods. The Ferry Lane Sewer at Rainham was also polluted by road and industrial run-off from a nearby industrial area. By the late 1990s, therefore, real concerns were expressed that the general lack of ditch or grassland management, cessation of significant grazing, environmental contamination and critically low water tables had impacted the ecology of the SSSI.

In July 2000, the Royal Society for the Protection of Birds secured ownership of 376 hectares of the marshes at Wennington and Aveley (approximately 77 per cent of the SSSI area) supported by the Cleanaway Havering Riverside Trust, the Heritage Lottery Fund, English Nature, RSPB members and individual donors. The SSSI supports an important assemblage of breeding birds reliant on reedbeds or tall vegetation, such as sedge, grasshopper and reed warblers and whitethroats, whose numbers are increasing (Dennis 2004). Winter migrants include raptors such as the short-eared owl (which formerly bred at the site), many waders such as redshank, lapwing and snipe, and wildfowl such as shelduck, shoveler, gadwall, coot, moorhen, water rail and little grebe attracted to the areas of Aveley Marsh which have been flooded since the mid to late 1990s. Areas of wet grassland and saltmarsh were traditionally of importance for numbers of wintering teal and dunlin. Species in national decline such as redshank and lapwing are also target species for the RSPB as they seek to restore wet grazing marsh habitats to the area.

There are nine silt lagoons, which cover about 152 ha of the SSSI, and these are leased by the Port of London Authority for disposal of dredgings from the tidal sections and non-tidal docks of the River Thames and River Medway. The lagoons were extended over part of Rainham Marsh in 1968 from their original location south of Coldharbour Lane and two more were added in 1980 over the western-most part of Wennington Marsh (Dennis 2004). A saltmarsh flora and fauna develops within the lagoons as saline water slurry is pumped ashore from outlet pipes at Coldharbour Lane. When operational in the 1980s the lagoons contained a mixture of habitats from open water to drying mud and they were of particular importance for wading birds. Their use declined during the 1990s with the closure of much of London's dock system (Port of London Authority website 2005). During 1998 the lagoons contained mostly rank vegetation or stands of *Phragmites,* with exposed saline mud and small areas of rain-filled standing water only found at the north of one of the new lagoons. Waste water from the lagoons enters adjacent parts of the ditch network via a series of outfalls. The receiving water drains are of elevated salinity and separated from the remainder of the marshes as they discharge directly towards the tidal sluices. Use of the lagoons by the PLA recommenced in 2000. The intention is for regular pumping to be undertaken outside the main breeding season for waterfowl and on a rotational basis between the older and newer lagoons. Combined with some extraction of silt for landfill capping, it is hoped this regime will create a mosaic of wetland habitats within the bunded areas (Dennis 2004).

Surveys have shown that the ditches, grasslands, saltmarsh and reedswamps of the SSSI harbour a rich invertebrate fauna with several *Red Data Book* and many nationally scarce species being recorded (Plant 1987; Drake 1988, 1990, 1995; Eversham et al. 1989; AERC 1998; Leeming 1998, 2001). The site supports a large number of aquatic invertebrate species characteristic of the freshwater end of the transition to brackish water, which differs from the situation of other coastal grazing marshes in Essex, but also retains a strong element of halophilous species of particular conservation interest associated with brackish water (Drake 1990). The ditches and standing waters also support great crested newts and a large population of water voles of regional/national significance. These species are listed within the UK Biodiversity Action Plan (BAP) and their protection forms part of the UK's contribution to the conservation of globally threatened species.

A requirement for Environment Agency ecologists to undertake an invertebrate survey of the Inner Thames Marshes was formally identified as an Action within the Roding, Beam, and Ingrebourne Local Environment Agency Plan (Environment Agency 1997). The principal aim for the 1998 survey was to record aquatic invertebrate assemblages and species distributions across the SSSI to update and extend existing information prior to the commissioning of the A13 Rainham Bypass and the development of the Channel Tunnel Rail Link across the site. Where possible, sites previously visited by the Nature Conservancy Council (Drake 1988, 1990 and 1995) were sampled. Additional areas included ditches in parts of Wennington Marsh, several ponds constructed to intercept road run-off at Rainham Marsh, recently flooded areas of Aveley Marsh and strategic locations falling just outside the SSSI. The 2001 survey of Rainham Marsh was undertaken to assess the effectiveness of Environment Agency pollution prevention and control initiatives in the Ferry Lane Industrial area.

As it turns out, the 1998 survey provides an important baseline account of the invertebrate fauna present before the current era of ambitious and relatively intensive watercourse management under RSPB ownership began at Aveley and Wennington. Until recently there has been limited public access to the reserve but an RSPB visitor centre will open soon. New tracks and trails are planned for safer site access, and additional areas of reedbed and standing water habitat will be created as well as extensive ditch clearance to redress former neglect (RSPB 2005). Seasonal water levels and cattle grazing intensity will also be managed to promote contrasting habitats within formalized compartments of the marsh. Imposing disused MOD structures such as the large concrete butts at Aveley, once used for target practice, have also been removed.

Study area

Over four days in mid to late June 1998 invertebrates were collected from eighty sites across the majority of the SSSI located to the south of the railway line. On the 12 July 2001, eighteen sites at Rainham marshes were sampled, fifteen having been sampled previously during 1998. The locations of all sampling sites are shown in Figure 1. The distribution of sites provided spatially representative information for the drainage ditch network and included a variety of areas of standing water in existence at the time.

The overall number of sites sampled within each compartment or SSSI management unit of the Inner Thames Marshes was broadly proportionate to the length of watercourse they contained. Rainham Marsh (92 ha, SSSI unit 1) was sampled most intensively with twenty-five sites overall, including one pond. Fifteen sites here were sampled twice during 1998 and 2001. The Silt Lagoons compartment (152 ha, SSSI unit 2) was sampled at nine sites including one area of standing water within the bunded area to the east. At

Wennington Marsh (SSSI units 8 and 9, 111 ha) twenty-three sites, including three isolated standing waters were sampled. Three ditches were sampled to the south of the Thames flood embankment at Wennington Marsh in a brackish reedmarsh forming part of a saltmarsh compartment (SSSI unit 6 with about 4 ha of similar habitat present). At Aveley Marsh (85 ha, SSSI unit 7) twenty-three sites were sampled including seven standing waters, four being recently flooded areas. The sites attributed to Rainham Marsh include two located on the Rainham Main Sewer outside the SSSI to the south (one being about 300 metres distant towards the tidal sluice), and one to the west on the Ferry Lane Sewer a short distance before it enters the SSSI.

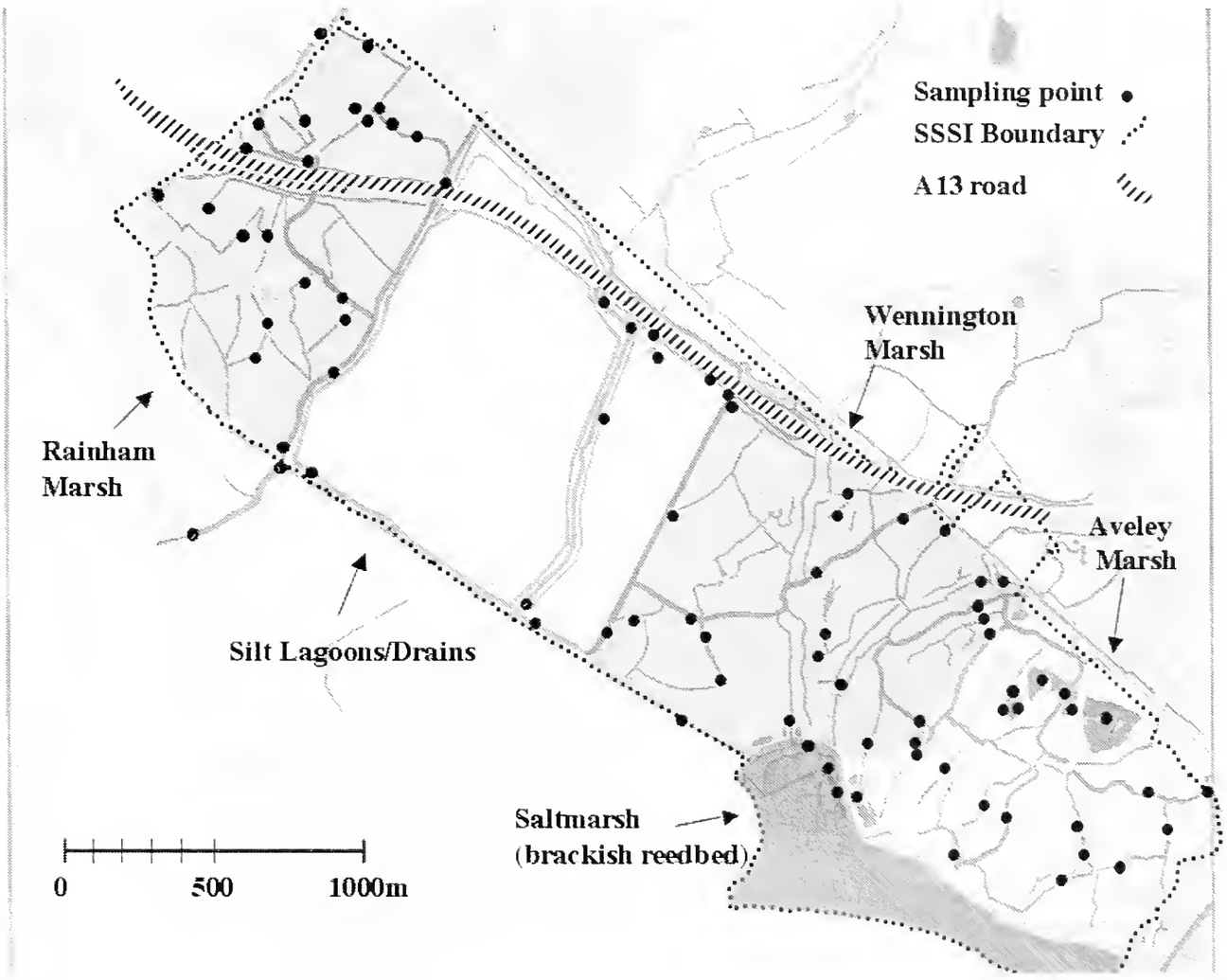

FIGURE 1. Locations of sampling points within the various compartments of the Inner Thames Marshes SSSI, 1998–2001.

A relatively comprehensive and reproducible list of the species present at sampling sites was obtained, broadly representative of the SSSI during the year(s) of sampling. Water levels were close to their long-term seasonal average at the time of the 1998 survey, which followed a wet spring and was undertaken during a prolonged spell of wet weather, but it was still apparent that a number of ephemeral pools had dried out completely. During 2001 water levels were particularly high at Aveley and Wennington and water was backing-up and flooding the site, exacerbated by the recommencement of pumping to the silt lagoons (Dennis 2004; C. Catlin pers. comm.). However, only Rainham was sampled during 2001 and localized dewatering associated with construction work for the Channel Tunnel Rail Link (CTRL) impacted several ditches to the north of the A13 where water levels were critically low.

Methods

Sampling methodology

The sampling area at individual sites ranged from about ten to twenty-five metres of ditch length, being shorter in the wider, deeper, main-river drains. Discrete water bodies were treated as a single unit and invertebrates were collected from a wider area, although sampling effort was broadly comparable. Sampling was usually conducted in an area that was typical of a reach of watercourse, or general vicinity of a marsh, containing the most prevalent habitat types in an area. A few sites were selected if they contained potentially important habitats — a grassy or muddy edge on a ditch in an area otherwise dominated by dense stands of *Phragmites* for example.

A standardized methodology was employed in the field collection of samples. This involved the active use of a long-handled pond-net (mesh size 0.9 mm), employing a combination of kick-sampling and net-sweep techniques for five minutes at each site. Floating or submerged objects which provided a potential substrate for invertebrates to attach or cling to were also inspected by hand, examples included floating wooden slats, discarded polystyrene blocks and plastic bags, and the submerged stems of emergent plants.

Sweep sampling was conducted in open water and amongst the submerged stems, leaves or roots of aquatic or bankside vegetation. Care was taken to ensure that all discrete habitats present at a site were sampled with the time spent in each kept broadly in proportion to their coverage. All parts of the channel were sampled and particular attention was given to sampling edge habitats and amongst different vegetation types and/or detritus that was present. Detrital habitats included the submerged remnants of previous years' growths of tall bankside herbs or emergent plants, and extensive flattened mats of standing-dead reed stems at some sites. Areas of reed or plant litter overlying water were sampled by creating small pools by trampling. Sweeps of the net were also used to collect surface-dwelling invertebrates on arrival at the site, prior to disturbance of the sampling area, or whenever such taxa were seen. Soft silts were sampled by skimming their surface with the pond net (to a depth of 2–3 cm). Exposed mud above the water line was sampled by splashing the area with the foot and netting through any dislodged animals.

Access into the water was possible at nearly all sites and unrestricted movement was possible within the smaller (non main-river) ditches and areas of standing water using chest waders. Here, kick sampling was also used to supplement sample collection. This involves disturbing areas of sediment or vegetation with the foot and catching dislodged animals by sweeping a net through the disturbed area. If access into the water was not possible, net sweeps of marginal habitats and the channel bed were conducted from the bank with the aid of a 2.5-metre pole (using a 1-metre extension). Where possible both banks were sampled.

Sample processing and identification

Samples were returned to the laboratory and fixed in 10 per cent formalin (4 per cent neutral buffered aqueous formaldehyde) within twelve hours of collection. Fixative and silt was washed from samples prior to sorting by rinsing samples through a 500 μm sieve in a fume cupboard. Larger aperture sieves were also used to split the sample into size fractions to aid sorting. Sorting was performed by placing a small quantity of sample material, together with a small amount of water, into a shallow white flat-bottomed plastic tray (dimensions 35 $\times$ 25 cm) marked by a grid into equal-sized squares. Material was systematically inspected, using the grids as an aid, under good lighting. Sorting was not time-limited and lasted from thirty minutes to five hours, depending upon the volume and type of sample material collected.

For species not readily identifiable by eye, individuals were removed from the plastic trays and stored in vials containing 70 per cent industrial methylated spirit for identification later. For groups other than aquatic Coleoptera, Hemiptera, Trichoptera, Odonata and some dipteran groups, sub-sampling was used, where necessary. For this, a representative selection of at least fifty invertebrates were picked from the tray, with the emphasis on obtaining a range of specimens of different sizes and coloration to ensure that all species present were represented. Aquatic macroinvertebrate taxa, including larvae, pupae and adults, were identified as far as available keys and experience allowed. Most invertebrates were identified to species-level, although identification to genus or species-group (Furse et al. 1989) was necessary for the poorly known larvae of particular Diptera (flies), damaged specimens, or closely related species which could not be reliably separated. Oligochaeta (worms), Chironomidae (midge larvae) and Hydracarina (water mites) were not identified further.

Results and discussion

Overview of species records obtained

The 1998 and 2001 surveys recorded 257 taxa overall, including around 205 that are regarded as fully aquatic, excluding microcrustaceans and other groups not normally regarded as macroinvertebrates. Appendix 1 presents the frequency of occurrence of all recorded taxa, showing the numbers of individuals recorded (approximate for more abundant taxa) and the percentage of sites at which they were found within each of the five compartments of the SSSI that were sampled. The number of taxa recorded at the fifteen Rainham Marsh sites sampled twice was quite similar between the two surveys with 112 in 1998 and 115 in 2001 (Leeming 2001). However, the repeat sampling of this marsh clearly affected the overall percentage occurrence of taxa at sites and the total number of individuals recorded from it. Whilst the number of sites sampled was similar between the three main study areas of marsh at Rainham, Wennington and Aveley (25, 23 and 23 respectively), the numbers of samples taken was not (40, 23 and 23 respectively).

The list of taxa recorded is dominated by insects, with Coleoptera (beetles: including 78 aquatic species), Hemiptera (water bugs: 19 spp.) and Diptera (true flies: about 45 taxa) strongly represented. The relatively low richness and frequency of occurrence of non-insect groups such as Tricladida (flatworms), Mollusca and Hirudinea (leeches) at Aveley Marsh probably reflects susceptibility to prolonged drying within this area during the 1990s. Wide variations in the richness and composition of assemblages occurred within the marshes reflecting local variations in the dominant environmental gradients of salinity, water permanence (susceptibility to drying) and vegetation structure.

The absence of the pea mussel *Pisidium* from all locations — except for a few individuals of *Pisidium milium* at one site on the Ferry Lane Sewer outside the SSSI at Rainham (site 61) — is noteworthy. *Pisidium* was not found in surveys of the SSSI undertaken by the NCC either (Drake 1988, 1990, 1995). This absence may reflect historic or ongoing limitations imposed by elevated salinity. The inability to colonize apparently suitable contemporary habitats from outside the SSSI is likely to affect several non-insect groups incapable of aerial colonization. *Pisidium* species regularly occur in marsh dykes, and larger, deeper, well-vegetated drains usually support a rich assemblage. Ubiquitous species such as *Pisidium personatum* can occur widely at stagnant sites or locations prone to drying-out. However, the only bivalves recorded within the SSSI proper were *Musculium lacustre* and *Sphaerium corneum*. These species were confined to the deeper main-river drains at Rainham and Wennington, with *M. lacustre* occurring more frequently and in greatest numbers. The characteristic species associated with particular site types across the SSSI are described below.

The larger 'main-river' drains

The main-river drains supported quite distinct invertebrate communities characterized by moderately diverse assemblages of aquatic gastropods, including *Valvata cristata*, *Physa fontinalis*, *Anisus vortex*, *Planorbarius corneus*, *Planorbis planorbis*, *Bithynia leachii* and *B. tentaculata* that were rarely found at any other sites. The distributions of the caddisflies *Limnephilus marmoratus*, *L. lunatus* and *Oecetis lacustris*, the mayfly *Caenis robusta* and several scarce species of water beetle including *Haliplus laminatus*, *Limnebius papposus* and *L. nitidus* were also confined to the main drains. The flightless nationally scarce diving beetle *Noterus crassicornis* was also associated with the larger drains, as in previous surveys undertaken at Rainham and Wennington (Drake 1988), but was found in several smaller ditches in close proximity. This species is abundant and widespread within the deeper, well-vegetated freshwater drains at Crayford Marshes on the opposite side of the Thames Estuary (Leeming 1996).

The habitat structure of the main-river drains was characterized by continuous fringes of tall emergent narrow-leaved vegetation, often monocultures of *Phragmites australis* (as on the Ferry Lane Sewer) or *Glyceria maxima* (as on most of the Wennington Main Drain). In some sections, including reaches partially dredged during the 1980s, more mixed stands of narrow-leaved emergents including *Carex* spp., *Juncus* sp., *Sparganium erectum*, *Typha latifolia* and *Phalaris arundinacea* were found. Broad-leaved species such as *Lycopus europaeus*, *Ranunculus scleratus*, *Apium nodiflorum* and *Rumex* sp. occurred infrequently. The naturalized weevil *Stenopelmus rufinasus* was associated with total surface cover by the introduced water-fern *Azolla filiculoides* in a section of main-river drain at Wennington (site 39). Elsewhere on the larger drains the duckweed *Lemna minor* occasionally achieved near total or heavy surface coverage, with lesser amounts of *Spirodela polyrhiza* and/or *Lemna trisulca* often present. The richness of submerged vegetation was correspondingly limited by shading in some sections, as it was by pollution for much of the Ferry Lane Sewer at Rainham Marsh. Hornworts *Ceratophylum demersum* and/or *C. submersum* occasionally covered large areas in the main drains and *Zannichellia palustris* was found in close proximity to a silt lagoon outfall and above the tidal sluice at Rainham. Small patches of *Callitriche* sp., *Elodea nuttallii* and *Potamogeton crispus* were also recorded sporadically.

Brackish drains and ditches

Whilst invertebrate richness was high in many of the freshwater main drains, particularly those with varied aquatic vegetation and habitat structure, many of the constituent species are equally associated with good quality freshwater ponds, lakes or larger slow-flowing rivers. A higher proportion of coastal brackish-water *halophilic* species was found in parts of the main-river drain network affected by saline outfalls from the silt lagoons or situated closest to the tidal sluices. These invertebrates were also recorded in brackish dykes within an area of reedmarsh south of the flood embankment at Wennington. Characteristic species of the more saline areas included the prawn *Palaemonetes varians*, shrimp *Gammarus duebeni*, corixid bug *Sigara stagnalis* and soldierfly *Nemotelus uliginosus*. Nationally Scarce halophilic water beetles species such as *Dytiscus circumflexus*, *Agabus conspersus*, *Rhantus frontalis* and *Enochrus bicolor* also occurred at these locations, but not exclusively so.

Overgrown/drying ditches with much reed or fen litter

This site type includes shallow semi-dry *Phragmites*-choked ditches generally regarded as having low importance for invertebrates. These sites were most frequently encountered at Rainham Marsh, but occurred widely within unmanaged areas of the SSSI. They supported restricted assemblages of

molluscs with the snails *Anisus leucostoma* and *Lymnaea peregra* often being the only species present. Small numbers of *Lymnaea palustris* were also found at some Wennington and Rainham sites, with additional drought-resistant species *Aplexa hypnorum* and *Lymnaea truncatula* confined to Rainham Marsh. *Aplexa hypnorum*, *Lymnaea truncatula* and *Anisus leucostoma* are particularly good indicators of ephemeral waterbodies or marshy areas — a niche shared by the declining RDB2 species *Lymnaea glabra* (Kerney 1999). In perennial waterbodies *Anisus leucostoma* is usually replaced by *A. vortex*. *Aplexa hypnorum* and *Lymnaea truncatula* often appear during the later stages of hydroseral succession from aquatic to terrestrial habitat, but *L. truncatula* has also been noted as an abundant pioneer species in the rewetted channel of a chalk stream following flow restoration to dry reaches (Leeming 1999 and unpublished data).

Species of conservation interest recorded from dense reed litter in semi-dry ditches were an important element of the fauna of the SSSI. This habitat produced more nationally scarce aquatic species than expected, more so with the identification of non-aquatic RDBK (Unknown) and Scarce A species. Examples included the scarce aquatic scavenger beetles *Helophorus nanus*, *Cercyon sternalis*, *C. tristis* and *C. convexiusculus*, a ground beetle *Bembidion semipunctatum* and smut beetle *Olibrus flavicornis*. Commonly found beetles such as scirtid larvae, *Hydroporus planus*, *Agabus bipustulatus*, *Hydrobius fuscipes*, *Helophorus brevipalpis*, *Anacaena limbata* and *Cymbiodytella marginella* were also characteristic, particularly within wetter sites.

Shallow ditches/standing waters with grass, rush or sedge tussocks

The individual sites producing the greatest component of rare or nationally scarce species were shallow, semi-permanent ditches or areas of standing water in more open surroundings. These situations were most frequently found across the Aveley and Wennington marshes and were characterized by dense or tussocky growths of varied low-growing vegetation including sedges, club rush or grasses with patches of shallow (typically <<10 cm deep) open water. The dominant submerged plant associated with these locations was *Ranunculus trichophyllous*, with unidentified *Ranunculus* and *Callitriche* also noted at a few sites. These sites often produced a wide variety of halophilic coastal water beetles, including some of the more important rarities associated with the SSSI such as *Agabus conspersus*, *Rhantus frontalis*, *Helophorus fulgidicollis*, *Enochrus halophilus*, *E. bicolor* and *Limnoxenus niger*, with *Haliplus apicalis* being found in slightly deeper more permanent areas of similar habitat. Other scarce freshwater wetland species including an adult *Hydrophilus piceus*, *Peltodytes caesus*, *Helophorus nanus* and *Berosus signaticollis* were also found at such locations.

New areas of standing water

During the 1998 survey, several large sheets of shallow (10–40 cm) standing water were flooding areas of grassland or sedge at Aveley Marsh, possibly arising from a blocked culvert impeding drainage. Although fairly recently formed (months not years) and lacking submerged aquatic vegetation, these areas supported abundant and quite diverse assemblages of corixid water bugs and other rapid colonizers of newly created habitat, such as water beetles. The water column also contained dense populations of large-bodied water fleas (Cladocera). The scarce beetles *Peltodytes caesus*, *Agabus conspersus*, *A. nebulosus*, *Rhantus frontalis*, *Limnoxenus niger* and *Enochrus biclor* were also found within these standing waters, as were larvae of the caddis *Limnephilus affinis/incisus* for which separation to species is not currently possible. Colonization by aquatic snails was limited and most advanced in the largest area of standing water present (about 3 ha) located to the east. Here, *Physa fontinalis*, *Lymnaea peregra*

abundant (>100 individuals). The other flooded areas lacked molluscs whilst *Crangonyx* was absent or present in low numbers. Larvae of the terrestrial beetle family Elateridae, shoreflies (Ephydridae), a muscid fly *Lispe* sp. and mosquito *Culex* sp. were also associated with the margins of these sites.

Invertebrate conservation interests

The current conservation status of all recorded species was obtained using RECORDER software (version 3.22, June 1996) supplemented by information contained in reviews of aquatic Coleoptera (Foster 2000) and particular Diptera (Falk and Chandler 2005). Table 1 lists all records for RDB and Nationally Scarce species from the two surveys. Overall, 4 RDB species, 3 Notable A species, 31 Notable B species and 59 Local species were found.

TABLE 1. Records of Red Data Book and Nationally Scarce invertebrate species for the Inner Thames Marshes SSSI, 1998–2001.

Red Data Book (RDB) species:
RDB2 ***Lestes dryas***: TQ53428067, 13.vi.1998. / RBD3 ***Hydrophilus piceus***: TQ52938098, 13.vi.1998; TQ54007952, 14.vi.1998; TQ54037955, 14.vi.1998; TQ54807932, 14.vi.1998. / RDB3 ***Aulacochthebius exaratus***: TQ52048074, 12.vii.2001. / RBDK ***Olibrus flavicornis***: TQ52208165, 18.vi.1998.

Nationally Scarce (Category A) species:
Enochrus halophilus: TQ51808094, 22.vi.1998; TQ53158087, 13.vi.1998; TQ53378073, 13.vi.1998 SM: TQ53667941, 13.vi.1998; 53627948, 13.vi.1998; TQ53428067, 13.vi.1998; TQ54238005, 14.vi.1998; TQ54007952, 14.vi.1998; TQ54107945, 14.vi.1998; TQ54607965, 14.vi.1998; TQ53807930, 18.vi.1998; TQ52308153, 12.vii.2001. / ***Harpalus melleti?***: TQ52158160, 18.vi.1998. / ***Bembidion semipunctatum***: TQ51938160, 18.vi.1998; TQ52308153, 18.vi.1998; TQ52208165, 18.vi.1998; TQ51628132, 22.vi.1998; TQ54187995, 14.vi.1998; TQ53757968, 18.vi.1998; TQ53657978, 18.vi.1998; TQ53657982, 18.vi.1998.

Nationally Scarce (Category B) species:
Sympetrum sanguineum: TQ52657997, 13.vi.1998; TQ53657982, 18.vi.1998 (+ adults in all marsh areas/compartments). / ***Peltodytes caesus***: TQ52687993, 13.vi.1998; TQ52938098, 13.vi.1998; TQ54027948, 14.vi.1998; TQ54007952, 14.vi.1998; TQ54107945, 14.vi.1998; TQ54307960, 14.vi.1998; TQ55017934, 14.vi.1998; TQ54847920, 14.vi.1998. / ***Haliplus laminatus***: TQ51748154, 18.vi.1998. / ***Haliplus apicalis***: TQ51948043, 22.vi.1998; TQ53807930, 18.vi.1998. / ***Noterus crassicornis***: TQ52428142, 18.vi.1998; TQ52687993, 13.vi.1998; TQ53028094, 13.vi.1998; TQ52938098, 13.vi.1998; TQ52947990, 13.vi.1998; TQ53057993, 13.vi.1998; TQ53277986, 13.vi.1998; TQ53557960, 13.vi.1998; TQ53378070, 13.vi.1998; TQ53188027, 13.vi.1998; TQ53157990, 13.vi.1998; TQ53768034, 14.vi.1998; TG53658004, 18.vi.1998; TQ54007952, 14.vi.1998. / ***Hygrotus parallelogrammus***: TQ51958108, 22.vi.1998; TQ51728120, 12.vii.2001; TQ51788121, 22.vi.1998; TQ51808094, 22.vi.1998; TQ51788082, 22.vi.1998 & 12.vii.2001; TQ51878047, 12.vii.2001; TQ52687993, 13.vi.1998; TQ53378073, 13.vi.1998; TQ53158080, 13.vi.1998; TQ51948043, 22.vi.1998; 53627948, 13.vi.1998; TQ53337969, 13.vi.1998; TQ53557960, 13.vi.1998; TQ53257958, 13.vi.1998; TQ54228004, 14.vi.1998; TQ54238005, 14.vi.1998; TQ53657982, 18.vi.1998; TQ54027948, 14.vi.1998; TQ54037955, 14.vi.1998; TQ54577909, 14.vi.1998; TQ54687909, 14.vi.1998; TQ54457902, 14.vi.1998; TQ54237930, 14.vi.1998; TQ54107945, 14.vi.1998; TQ54257984, 14.vi.1998; TQ54317971, 14.vi.1998; TQ54227965, 14.vi.1998; TQ54307960, 14.vi.1998; TQ54577960, 14.vi.1998; TQ54607965, 14.vi.1998; TQ54807932, 14.vi.1998; TQ55017934, 14.vi.1998; TQ54847920, 14.vi.1998; TQ53807930, 18.vi.1998. / ***Rhantus suturalis***: TQ51828164, 12.vii.2001; TQ52108096, 22.vi.1998; TQ51728120, 12.vii.2001; TQ51628132, 22.vi.1998; TQ51808094, 22.vi.1998; TQ51428134, 22.vi.1998; TQ51948043, 22.vi.1998; TQ53057993, 13.vi.1998; TQ53188027, 13.vi.1998; TQ54238005, 14.vi.1998; TQ54147910, 14.vi.1998; TQ54107945, 14.vi.1998; TQ54607965, 14.vi.1998; TQ54807932, 14.vi.1998. / ***Rhantus frontalis***: TQ51858148, 12.vii.2001; TQ52308153, 18.vi.1998; TQ52148185, 18.vi.1998; TQ52108096, 12.vii.2001; TQ51958108, 12.vii.2001; TQ51728120, 18.vi.1998 & 12.vii.2001; TQ51788121, 18.vi.1998 & 12.vii.2001; TQ51808094, 22.vi.1998; TQ51788082, 22.vi.1998 & 12.vii.2001; 53627948, 13.vi.1998; TQ53727935, 18.vi.1998; TQ53057993, 13.vi.1998; TQ53337969, 13.vi.1998; TQ53817953, 13.vi.1998; TQ53428067, 13.vi.1998; TQ54247991, 14.vi.1998; TQ54238005,

14.vi.1998;, TQ53657978, 18.vi.1998; TQ53657982, 18.vi.1998; TQ54027948, 14.vi.1998;, TQ54007952, 14.vi.1998; TQ54577909, 14.vi.1998; TQ54687909, 14.vi.1998; TQ54457902, 14.vi.1998;, TQ54237930, 14.vi.1998; TQ54107945, 14.vi.1998; TQ54317971, 14.vi.1998; TQ54307960, 14.vi.1998; TQ54457967, 14.vi.1998; TQ54577960, 14.vi.1998; TQ54607965, 14.vi.1998; TQ54807932, 14.vi.1998; TQ55017934, 14.vi.1998; TQ54847920, 14.vi.1998;, TQ53807930, 18.vi.1998. / ***Hydaticus seminiger*:** TQ52108096, 12.vii.2001; / ***Dytiscus circumflexus*:** TQ51948043, 22.vi.1998; TQ51428134, 22.vi.1998. / ***Ochthebius viridis*:** TQ51858148, 12.vii.2001; **70:** TQ52048074, 12.vii.2001; TQ52108096, 12.vii.2001; TQ51728120, 12.vii.2001; TQ54317971, 14.vi.1998; TQ53807930, 18.vi.1998. / ***Ochthebius marinus*:** TQ52068102, 12.vii.2001; TQ53158080, 13.vi.1998. / ***Hydraena testacea*:** TQ52108096, 12.vii.2001; TQ52068102, 12.vii.2001; TQ51788121, 12.vii.2001; TQ53028094, 13.vi.1998; TQ54038026, 14.vi.1998. / ***Limnebius nitidus*:** TQ52048074, 12.vii.2001. / ***Limnebius papposus*:** TQ53428067, 13.vi.1998. / ***Helophorus nanus*:** TQ51938160, 18.vi.1998; TQ52218159, 12.vii.2001; TQ52208165, 18.vi.1998; TQ51628132, 22.vi.1998; TQ51788082, 22.vi.1998; TQ53028094, 13.vi.1998; TQ53057993, 13.vi.1998; TQ53758025, 14.vi.1998; TQ55017934, 14.vi.1998. / ***Helophorus fulgidicollis*:** TQ51808094, 22.vi.1998; TQ51788082, 22.vi.1998; TQ53158080, 13.vi.1998; TQ53337969, 13.vi.1998; TQ53428067, 13.vi.1998; TQ54238005, 14.vi.1998; TQ53758025, 14.vi.1998; TQ53657982, 18.vi.1998; TQ54457902, 14.vi.1998. / ***Helophorus griseus*:** TQ54147910, 14.vi.1998; TQ54227965, 14.vi.1998. / ***Limnoxenus niger*:** TQ53337969, 13.vi.1998; TQ52948064, 13.vi.1998; TQ54607965, 14.vi.1998; TQ53807930, 18.vi.1998. / ***Anacaena bipustulata*:** TQ52048074, 22.vi.1998. / ***Cercyon tristis*:** TQ51858148, 12.vii.2001; TQ51748154, 12.vii.2001; TQ52218159, 12.vii.2001; TQ52208165, 18.vi.1998; TQ52108096, 12.vii.2001; TQ52068102, 22.vi.1998; TQ53057993, 13.vi.1998; TQ54247991, 14.vi.1998; TQ54607965, 14.vi.1998. / ***Cercyon sternalis*:** TQ52208165, 18.vi.1998; TQ53028094, 13.vi.1998; 53627948, 13.vi.1998; TQ53057993, 13.vi.1998; TQ53277986, 13.vi.1998; TQ53188027, 13.vi.1998; TQ53758025, 14.vi.1998; TQ53757968, 18.vi.1998; TG53658004, 18.vi.1998; TQ54147910, 14.vi.1998; TQ54257984, 14.vi.1998; TQ54227965, 14.vi.1998; TQ51858148, 12.vii.2001; TQ51748154, 12.vii.2001; TQ52218159, 12.vii.2001; TQ52108096, 12.vii.2001. / ***Enochrus quadripunctatus*:** TQ54107945, 14.vi.1998. / ***Enochrus bicolor*:** TQ53158080, 13.vi.1998; TQ51948043, 22.vi.1998; 53627948, 13.vi.1998; TQ53657982, 18.vi.1998; TQ54107945, 14.vi.1998; TQ54607965, 14.vi.1998. / ***Enochrus melanocephalus*:** TQ53158087, 13.vi.1998; TQ53378073, 13.vi.1998; TQ52308153, 12.vii.2001; TQ52048074, 12.vii.2001; TQ51788121, 12.vii.2001. / ***Berosus affinis*:** TQ51728120, 12.vii.2001. / ***Berosus signaticollis*:** TQ53657982, 18.vi.1998; TQ54007952, 14.vi.1998; TQ54577909, 14.vi.1998; TQ54557920, 14.vi.1998; TQ55017934, 14.vi.1998; TQ53807930, 18.vi.1998; (+ *Berosus* sp. larvae only at TQ53428067, TQ51728120, TQ53627948, TQ53727935, TQ53337969, TQ54687909, TQ54457902, TQ54107945, TQ54577960, TQ54607965, TQ54807932, TQ54847920 during1998.) / ***Otiorhynchus raucous*:** TQ54807932, 14.vi.1998. / ***Notaris scirpi*:** TQ53807930, 18.vi.1998. / ***Stratiomys singularior*:** TQ54038026, 14.vi.1998; TQ54457902, 14.vi.1998; TQ54527968, 14.vi.1998; TQ54807932, 14.vi.1998*; TQ52308153, 12.vii.2001*; TQ52048074, 12.vii.2001 (* as *Stratiomys* sp.).

Key species

The RDB3 great silver diving beetle *Hydrophilus piceus* was first recorded at Aveley Marsh in 1990 (Drake 1990). During the 1998 survey *Hydrophilus* larvae were found at two ditches on this marsh that were both relatively deep (*c.*50 cm). An adult female, returned in the field, was also found within an attractive area of open standing water close to one of these ditches and to the west of the butts at Aveley Marsh. This water body contained flowering *Ranunculus trichophyllus*, clear open water and emergent vegetation. A single *Hydrophilus* larva was also found in a main drain choked with aquatic vegetation in the silt lagoons compartment that was not affected by saline outfalls. This site provided more typical habitat for larvae of this species, being densely vegetated by *Glyceria maxima* and *Phragmites australis* with near total coverage by *Azolla filiculoides*, *Enteromorpha* agg. and *Lemna* spp. over *Ceratophyllum submersum* and *Elodea nuttallii*. The presence of *Hydrophilus piceus* at the Inner Thames Marshes is particularly significant as there were only historic records for this declining species in the London area or within Essex, and its contemporary distribution is more or less confined to the Somerset Levels, Norfolk Broads and coastal levels in Kent and Sussex (Foster 2000). Whilst many inland marshes have lost *Hydrophilus* due to land drainage and insensitive ditch

management in the post war period, coastal grazing marshes still support the relatively unmanaged vegetation-choked standing water favoured by this species.

The 2001 survey of Rainham Marsh produced a single specimen of the RDB3 scavenger beetle *Aulacochthebius exaratus* first recorded here by Dan Hackett in 1998 (AERC 1998). This tiny (1.3 mm) species is associated with bare muddy edges at or above the waterline, a habitat well represented where it was found. Several other hydraenid scavenger beetles in the genera *Hydraena*, *Limnebius* and *Ochthebius* occur in similar habitats and were most commonly found at Rainham during 2001. Other species, such as the Notable beetles *Agabus conspersus*, *Rhantus frontalis* and *Berosus signaticollis* were widely found during 1998 and their distribution appears to have increased in comparison with previous surveys. *B. signaticollis* was not recorded at the Inner Thames Marshes until 1988 (Drake 1988) but identifiable adults or *Berosus* sp. larvae were found at about half the survey sites visited within Aveley Marsh during 1998.

The nationally scarce beetles *Hydaticus seminiger, Berosus affinis*, *Enochrus quadripunctatus*, *Enochrus melanocephalus*, *Limnebius papposus*, *L. nitidus* and *Hydraena testacea* and weevils *Otiorhynchus raucous* and *Notaris (Erirhinus) scirpi* recorded during 1998 or 2001 also add to the lists provided by Drake (1988, 1990, 1995). Non-aquatic beetles that were fully identified for the 1998 survey included new finds for a RDBK (unknown) smut beetle *Olibrus flavicornis* and two nationally scarce (category A) ground beetles *Bembidion semipunctatum* and *Harpalus melleti*. A detailed survey of terrestrial wetland invertebrates would undoubtedly reveal further species of conservation importance since the sporadic records produced by the 1998 survey were obtained using a crude and inefficient method for the collection of such invertebrate groups. Earlier surveys of the site have shown its importance for Lepidoptera (butterflies and moths) and Arachnida (spiders) dependent upon the mixture of wetland and grassland habitats present (Plant 1987).

Of the important aquatic species known from the marshes, only the RDB2 weevil *Bagous cylindrus* and the nationally scarce soldierfly *Odontomyia tigrina* recorded at individual sites by Drake (1990, 1995) were not found during 1998 or 2001. The scarce emerald damselfly *Lestes dryas* (RDB2) exhibited a reduced distribution by 1998, although this observation may be partly explained by the timing of sample collection within the adult emergence period. *Lestes dryas* was certainly lost from its only known location at Rainham Marsh (site 52) in an isolated *Phragmites* ditch (Drake 1988). This ditch was semi-dry and contained much reed litter in 1998 when it yielded *Aplexa hypnorum* (new to the SSSI) and in July 2001 it had dried out entirely. The damselfly was not found at Aveley Marsh during 1998 either, although it was recorded from three of the sites visited there in late May 1990 and another in late June that year (Drake 1990). Fully-grown *Lestes dryas* larvae were collected in quite large numbers (26 individuals) from a small (2–3 m wide) shallow (<20 cm) ditch at Wennington Marsh that was choked with sedge and associated litter underlain by firm clay (site 18). However, this species was absent from all other sites including many offering broadly similar habitat provision. Patchy, contagiously distributed larval populations of this damselfly may render detection by aquatic invertebrate surveys rather difficult.

Further Notable aquatic species probably occurred within samples but were not identifiable using keys currently available. This situation applies to many Diptera families in particular. Larvae of the muscid *Lispe* sp. was found in the recently flooded areas of Aveley marsh and this genus contains a number of Notable and Local species associated with such habitats. Adults of the Notable B dragonfly *Sympetrum sanguineum* were recorded at Rainham, Wennington and Aveley during 1998 (Andy Gordon pers. comm.) but due to the difficulty of separating larvae from *Sympetrum striolatum*, specimens were not generally

identified to species. The frequency of occurrence of *Dytiscus* species was also affected by capture of subadult life stages and separation of *D. marginalis* (a common species) from *D. circumflexus* (a rarer Notable B species) was problematic. *Dytiscus* larvae occurred widely and frequently during 1998 but only two adults, both of the rarer species, were captured.

Variation between compartments of the marshes

Table 2 summarizes the total number of species recorded in the various JNCC categories of conservation status for the principal compartments (management units) of the SSSI. Conservation scores based upon a simple NCC methodology are also given. These were calculated from the sum of scores attributed to the species found, with RDB species allocated 100 points, Notable A species 50 points, and Notable B (or Notable Diptera) 40 points and Local species 10 points.

TABLE 2. Numbers of species or taxa recorded within categories of conservation status for each compartment of the Inner Thames Marshes SSSI, 1998–2001.

	Overall	**Rainham**	**Lagoons**	**Reedmarsh**	**Wennington**	**Aveley**
RDB species:	4	2	1	0	1	1
Scarce A species	3	3	1	1	2	1
Scarce B species:	31	21	14	5	17	20
Local species:	59	31	17	8	38	27
Common species:	118	89	51	22	80	68
Other taxa or species:	42	31	28	8	34	27
Total No. taxa:	257	177	112	44	172	144
Site conservation score:	2,380	1,500	880	330	1,260	1,220
% Notable/RDB species:	14.8	14.7	14.3	13.6	11.6	15.3
Mean score per sample:	149.6	116.4	160.0	163.3	150.0	195.2

The highest overall site score was obtained at Rainham Marsh and reflected the greater number of scarce or higher status species found there. However, this finding is influenced strongly by the larger number of samples collected (40) compared to the other compartments of the SSSI (23 or fewer), which increased the rate of detection of species, as noted earlier. Rainham Marsh was most degraded by lack of management and was visibly polluted in parts, particularly during 1998. The low average conservation score of samples better reflects the general condition of this area over the 1998 to 2001 period. The highest average scores were found at Aveley Marsh.

Direct comparison of conservation scores against those reported by earlier surveys (e.g. Drake 1988, 1990, 1995; Leeming 1998, 2001) is potentially misleading since the status of particular species has been downgraded during the intervening years. For example, the meniscus midge *Dixella attica* associated with brackish marshes was given RDB3 status by Shirt (1987) subsequently downgraded to Notable B by Falk (1991), a status which it has recently lost because 'it is now known to occur at about 50 sites' (Falk and Chandler 2005). Other similarly downgraded species include *Helochares lividus* and *Cercyon convexiusculus* now known occur in well over 100 hectads (10-km squares of the National Grid) (Foster 2000). These are listed here as 'Local' species. Although this category has no statutory basis and was omitted from RECORDER 2000 species accounts, it is still useful in terms of conservation evaluation, particularly within a local context.

The conservation score(s) recorded for all individual sampling points at the Inner Thames Marshes is depicted in Figure 2. Individual sites producing

scores over 200 (well above the site average of 149) were widely scattered and found in all parts of the SSSI. These sites included representatives of all habitat types described earlier. Changes to the category of score obtained at the fifteen Rainham sites sampled in 1998 and 2001 (3 deteriorating, 7 improving and 5 no change) are also shown.

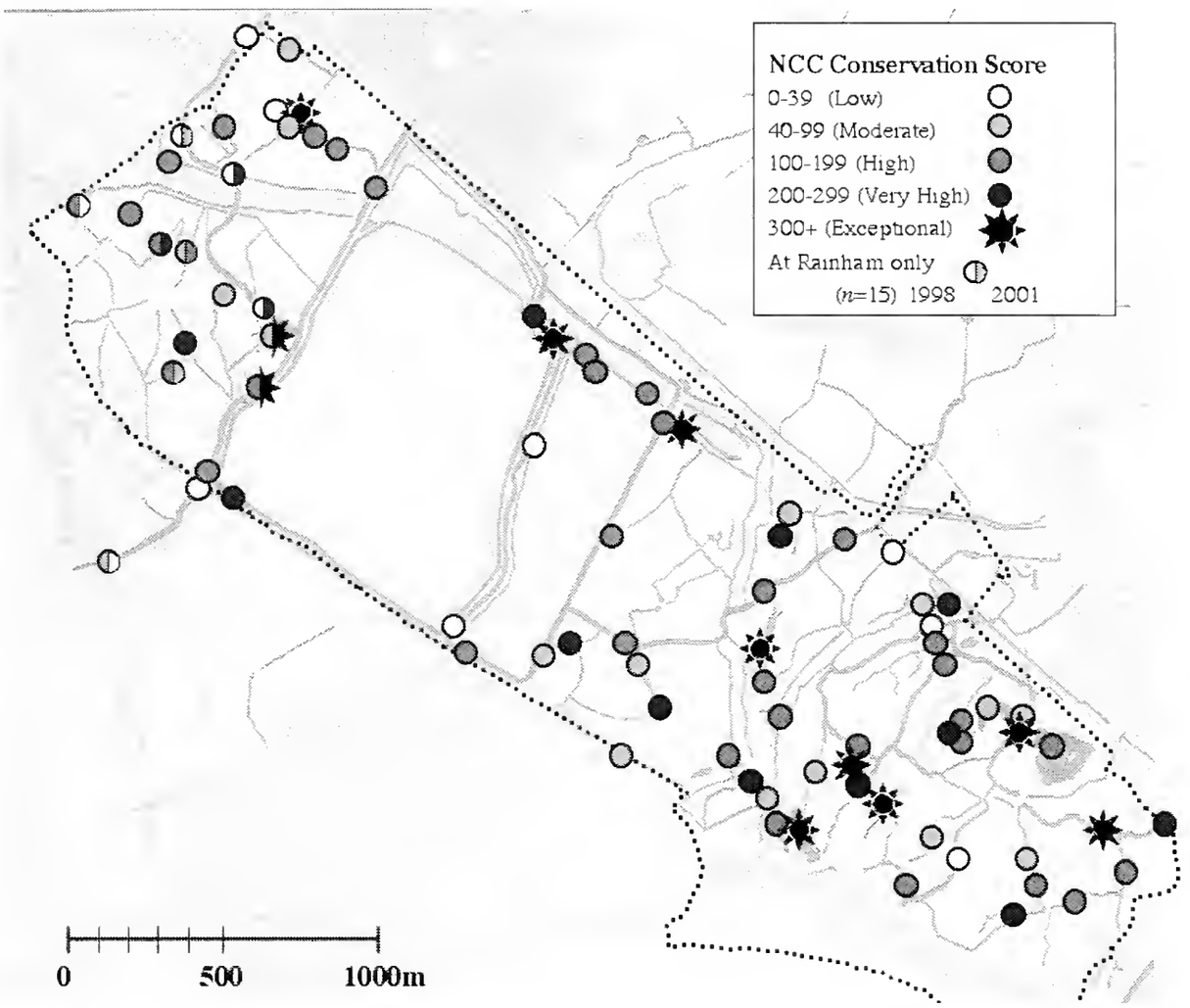

FIGURE 2. Site conservation scores at the Inner Thames Marshes SSSI, 1998–2001.

Temporal changes at Rainham Marsh, 1998–2001

Five of the nationally scarce aquatic species found at Rainham during 1998 were not found there during 2001, but new finds for one RDB species and twelve scarce species were obtained. Changes to the frequency of occurrence of taxa during repeat surveys at Rainham were assessed for the subset of fifteen sites sampled twice by Leeming (2001). On average, the conservation score increased by 67 and the number of taxa by 6 at these sites between the two surveys. All three sites on the Ferry Lane Sewer within the SSSI produced higher scores during 2001, as did a site on the Rainham Main Sewer below the point where it is joined by this watercourse. These changes were attributable to recovery from severe pollution. The first of these sites on the Ferry Lane Sewer produced just two taxa during 1998 with eighteen being found in 2001. At the next site downstream richness increased from eight to twenty-eight taxa over this period and the conservation score rose from twenty to 210.

Colonization of Rainham by *Berosus affinis* is consistent with other appearances of this mobile species in well-recorded areas, as on the Ashdown Forest after hot weather during 1995 (Foster 2000). Several new finds at Rainham were associated with habitat changes. In high summer 2001 water levels were lower than in 1998 and provided exposed muddy edges (benefiting *Ochthebius marinus*: 0 and 7 per cent of the fifteen sites sampled in 1998 and

2001 respectively; and *O. viridis*: 0 and 27 per cent) or areas of drying habitat (suiting *Cercyon tristis*: 0 and 27 per cent; *C. sternalis*: 0 and 20 per cent; *Hydaticus seminiger*: 0 and 7 per cent; and *Hydraena testacea* 0 and 20 per cent). Several species associated with permanent open water, including a main drain north of the A13 affected by dewatering during 2001, were less widespread (*Chaoborus crystallinus*: 60 and 20 per cent; *Dytiscus* spp: 33 and 0 per cent; *Haliplus laminatus*: 7 and 0 per cent; *Musculium lacustre*: 20 and 7 per cent). The effect of recommencement of saline silt pumping during 2000 upon *Ochthebius marinus*, only found in a relict pool in a silt lagoon during 1998, is unclear, as this area was not visited during 2001. Most of the additional species found at Rainham were, however, freshwater wetland species.

Conclusions

The results of the 1998 and 2001 aquatic invertebrate surveys of the Inner Thames Marshes showed that the SSSI continued to support an important invertebrate fauna. Virtually all previously recorded scarce species were present and additional species were found. These findings demonstrate the resilience of invertebrate assemblages across the SSSI to the periodic drying-out of habitats and other deleterious changes observed during the early to mid 1990s. Records of key species of water beetles were obtained throughout the marshes, reflecting their mobility and ability to colonize suitable habitat. The rapid, significant benefits of pollution prevention and control initiatives at Rainham Marsh underlines the ecological potential of the area and the merit of targeted habitat restoration measures. Ongoing and future habitat management initiated by the RSPB may be expected to maintain or enhance further still the distribution and variety of sites of high importance for invertebrates across the Aveley and Wennington parts of the SSSI.

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Appendix follows

APPENDIX

List of taxa recorded at Inner Thames Marshes SSSI during 1998–2001, showing percentage occurrence and estimated number of individuals found in each compartment

Compartments (EN SSSI management units) as follows: R=Rainham marsh (EN unit 1); SLD=Silt Lagoon Drains (EN unit 2); SM=Saltmarsh at brackish reedmarsh (part of EN unit 6); W=Wennington Marsh (EN units 8& 9); A=Aveley Marsh (EN unit 7)

Status	Taxon	Overall %	% of sites by compartment					Total number recorded/estimated				
		(*n*=83 sites)	R	SLD	SM	W	A	R	SLD	SM	W	A
–	Nematoda	4.8	4	11	–	–	9	1	1	0	0	4
–	Planariidae (incl. Dugesiidae)	1.2	–	11	–	–	–	0	1	0	0	0
(Common)	*Polycelis nigra* group	14.5	12	22	–	17	13	12	5	0	22	9
(Common)	*Dugesia polychroa* group	7.2	8	11	–	13	–	3	2	0	11	0
Common	*Dendrocoelum lacteum*	20.5	24	11	–	35	9	23	4	0	136	50
Local	*Valvata cristata*	3.6	–	22	–	4	–	0	90	0	3	0
Common	*Hydrobia ulvae*	1.2	–	–	–	–	4	0	0	0	0	1
Naturalized	*Potamopyrgus antipodarum*	9.6	20	11	–	4	4	3,060	3	0	35	3
Common	*Bithynia tentaculata*	15.7	4	22	–	43	–	35	357	0	663	0
Local	*Bithynia leachii*	13.3	4	33	–	30	–	15	151	0	578	0
Common	*Lymnaea truncatula*	3.6	12	–	–	–	–	13	0	0	0	0
Common	*Lymnaea palustris*	21.7	60	–	–	13	–	276	0	0	17	0
Common	*Lymnaea stagnalis*	1.2	–	–	–	4	–	0	0	0	1	0
Common	*Lymnaea peregra*	71.1	60	78	67	83	70	2,276	1,918	9	8,747	11,972
Local	*Aplexa hypnorum*	1.2	4	–	–	–	–	6	0	0	0	0
Common	*Physa fontinalis*	15.7	4	22	–	39	4	75	1,501	0	935	35
Naturalized	*Physa acuta* group	20.5	40	11	–	9	17	4,090	7	0	76	25
Common	*Planorbarius corneus*	4.8	12	11	–	–	–	20	3	0	0	0
–	*Planorbis* sp.	7.2	24	–	–	–	–	195	0	0	0	0
Common	*Planorbis planorbis*	21.7	16	44	–	39	4	1,656	330	0	854	150
Common	*Anisus vortex*	16.9	16	44	–	26	–	172	665	0	199	0
Common	*Anisus leucostoma*	53.0	24	–	33	83	78	2,432	0	3	7,098	2,432
Local	*Bathyomphalus contortus*	3.6	4	22	–	–	–	7	36	0	0	0
Common	*Armiger crista*	3.6	4	11	–	–	4	8	3	0	0	35
–	Succineidae	13.3	12	11	–	30	–	6	15	0	22	0
Common	*Oxyloma pfeifferi*	2.4	4	–	–	–	4	1	0	0	0	2
–	Zonitidae	3.6	8	11	–	–	–	2	4	0	0	0
Local	*Zonitoides nitidus*	2.4	4	–	–	4	–	1	0	0	1	0
Common	*Sphaerium corneum*	2.4	4	–	–	4	–	150	0	0	1	0
Common	*Sphaerium lacustre*	15.7	20	22	–	26	–	348	38	0	459	0
Common	*Pisidium millium*	1.2	4	–	–	–	–	14	0	0	0	0
Common	*Theromyzon tessulatum*	2.4	4	–	–	4	–	1	0	0	1	0
Common	*Glossiphonia complanata*	7.2	12	22	–	4	–	40	22	0	1	0
Local	*Glossiphonia heteroclita*	2.4	4	0	–	4	–	1	0	0	2	0
Common	*Helobdella stagnalis*	8.4	16	11	–	4	4	10	15	0	3	2
Local	*Trocheta subviridis*	2.4	8	–	–	–	–	2	0	0	0	0
Local	*Trocheta bykowskii*	2.4	–	–	–	9	–	0	0	0	3	0
Common	*Erpobdella octoculata*	4.8	4	11	–	9	–	1	3	0	3	0
Local	*Dina lineata*	2.4	–	11	–	4	–	0	4	0	6	0
–	Oligochaeta	77.1	68	67	100	87	78	1,145	86	7	646	869
–	Hydracarina	19.3	32	11	–	9	22	20	2	0	2	13
–	Lycosidae	15.7	8	11	–	22	22	3	1	0	13	5
Common	*Pirata piraticus*	1.2	–	11	–	–	–	0	1	0	0	0
–	Cladocera	49.4	52	22	33	39	70	4,349	50	3,500	7,476	38,595

Status	Taxon	Overall % (n=83 sites)	% of sites by compartment					Total number recorded/estimated				
			R	SLD	SM	W	A	R	SLD	SM	W	A
–	Copepoda	15.7	36	11	–	13	–	326	15	0	33	0
–	Ostracoda	28.9	36	–	33	30	30	1,548	0	15	254	476
–	Collembola	16.9	32	–	–	9	17	1,561	0	0	6	12
Common	*Asellus aquaticus*	80.7	88	78	33	87	74	7,914	3,574	3	2,363	5,814
Common	*Asellus meridianus*	24.1	8	–	–	35	43	70	0	0	1,351	447
Naturalized	*Crangonyx pseudogracilis*	69.9	72	33	–	91	70	888	166	0	454	558
Common	*Gammarus duebeni*	16.9	20	56	100	–	4	775	263	388	0	1
Common	*Palaemonetes varians*	6.0	8	22	33	–	–	43	7	350	0	0
Naturalized	*Eriocheir sinensis* (leg only)	1.2	4	–	–	–	–	1	0	0	0	0
Local	*Caenis robusta*	2.4	–	–	–	9	–	0	0	0	2	0
Common	*Cloeon dipterum*	10.8	16	22	33	4	4	131	2	1	4	14
Local	*Lestes sponsa*	10.8	8	22	–	17	4	12	10	0	24	1
RDB2	*Lestes dryas*	1.2	–	–	–	4	–	0	0	0	26	0
Common	*Ischnura elegans*	24.1	28	67	–	13	17	14	73	0	27	11
Common	*Coenagrion puella*	2.4	4	–	–	4	–	1	0	0	1	0
–	*Sympetrum striolatum/ sanguineum*	43.4	12	44	33	70	52	77	53	1	270	98
Common	*Sympterum striolatum*	2.4	–	22	–	–	–	0	2	0	0	0
Scarce B	*Sympetrum sanguineum*	2.4	–	11	–	4	–	0	1	0	9	0
Common	*Anax imperator*	3.6	12	–	–	–	–	3	0	0	0	0
–	*Aeshna mixta* group	25.3	16	33	67	35	17	7	10	5	32	46
Common	*Hydrometra stagnorum*	4.8	12	–	–	4	–	3	0	0	1	0
–	*Gerris* sp. (nymph)	41.0	48	11	–	13	78	40	1	0	10	61
Common	*Gerris lacustris*	1.2	4	–	–	–	–	1	0	0	0	0
Common	*Gerris thoracicus*	22.9	16	–	–	4	61	20	0	0	7	69
Common	*Gerris odontogaster*	14.5	28	–	33	4	13	25	0	1	2	4
Common	*Nepa cinerea*	16.9	44	–	–	9	4	22	0	0	2	2
Common	*Ilyocoris cimicoides*	20.5	12	33	33	22	22	19	10	1	9	8
–	*Notonecta* sp. (nymph)	56.6	60	56	67	48	61	254	26	2	56	145
Common	*Notonecta glauca*	8.4	24	11	–	–	–	84	1	0	0	0
Common	*Notonecta marmorea viridis*	4.8	4	11	–	4	4	4	1	0	1	1
Common	*Plea minutissima*	13.3	16	22	–	9	13	10	8	0	3	10
–	Corixidae (nymph)	66.3	60	100	67	57	70	390	453	3	214	1,250
–	*Corixa* sp.	30.1	24	22	–	35	39	19	16	0	20	61
Local	*Corixa affinis*	14.5	16	–	–	4	30	4	0	0	2	21
Common	*Corixa punctata*	14.5	32	11	–	–	13	36	52	0	0	3
Common	*Hesperocorixa linnei*	20.5	16	11	–	9	43	28	1	0	5	17
Common	*Hesperocorixa sahlbergi*	41.0	36	11	–	39	65	105	3	0	44	47
Common	*Sigara dorsalis*	41.0	44	56	–	13	65	61	51	0	12	186
Local	*Sigara stagnalis*	16.9	20	56	33	–	13	75	85	2	0	11
Common	*Sigara lateralis*	21.7	20	11	–	4	48	65	10	0	3	405
Local	*Sigara concinna*	9.6	8	–	–	–	26	2	0	0	0	86
Common	*Sigara falleni*	2.4	–	–	–	–	9	0	0	0	0	8
Common	*Callicorixa praeusta*	18.1	16	–	–	4	43	21	0	0	1	69
Common	*Legnotus limbosus*	2.4	4	–	–	–	4	1	0	0	0	1
–	Hemiptera indet. (terrestrial)	13.3	8	11	–	30	4	2	150	0	70	1
Scarce B	*Peltodytes caesus*	9.6	–	22	–	–	26	0	2	0	0	16
–	*Haliplus* sp. (larvae)	34.9	16	44	–	35	57	11	12	0	20	115
Common	*Haliplus lineatocollis*	20.5	16	44	33	22	13	4	30	2	31	4
Local	*Haliplus obliquus*	2.4	–	–	–	–	9	0	0	0	0	2
Scarce B	*Haliplus laminatus*	1.2	4	–	–	–	–	2	0	0	0	0
Common	*Haliplus ruficollis*	28.9	24	33	–	48	17	19	22	0	39	6
Local	*Haliplus immaculatus*	10.8	12	–	–	13	13	19	0	0	8	3
Scarce B	*Haliplus apicalis*	2.4	–	11	–	–	4	–	1	0	0	2
Local	*Hygrobia hermanni*	7.2	8	–	–	–	17	2	0	0	0	4
–	*Noterus* sp. (larvae)	7.2	–	33	–	9	4	0	4	0	2	1
Local	*Noterus clavicornis*	31.3	20	33	33	39	35	5	16	1	20	24

Status	Taxon	Overall % (n=83 sites)	% of sites by compartment					Total number recorded/estimated				
			R	SLD	SM	W	A	R	SLD	SM	W	A
Scarce B	*Noterus crassicornis*	16.9	4	33	–	39	4	7	15	0	23	1
(Local)	*Laccophilus* sp. (larvae)	4.8	16	–	–	–	–	8	0	0	0	0
Local	*Laccophilus minutus*	36.1	48	11	33	22	48	57	13	8	13	116
–	Hydroporinae larvae indet.	45.8	32	44	100	30	70	64	18	32	24	497
Common	*Hyphydrus ovatus*	14.5	16	22	–	13	13	7	3	0	5	9
Local	*Graptodytes pictus*	1.2	–	–	–	4	–	0	0	0	1	0
Common	*Hygrotus inaequalis*	44.6	60	56	–	48	26	285	31	0	27	22
Local	*Hygrotus confluens*	7.2	4	–	–	4	17	1	0	0	1	9
Scarce B	*Hygrotus parallelogrammus*	3.6	8	–	–	4	–	2	0	0	1	0
Local	*Hygrotus impressopunctatus*	26.5	36	–	–	22	35	42	0	0	27	21
Common	*Hydroporus angustatus*	21.7	40	–	–	22	13	43	0	0	9	5
Common	*Hydroporus memnonius*	22.9	4	–	33	39	30	1	0	2	33	20
Local	*Hydroporus tesselatus*	2.4	–	–	–	4	4	0	0	0	1	1
Common	*Hydroporus pubescens*	4.8	–	–	–	–	17	0	0	0	0	7
Common	*Hydroporus planus*	66.3	68	44	67	61	78	204	5	13	200	280
Common	*Hydroporus palustris*	61.4	44	67	33	78	65	112	41	2	191	92
Local	*Copelatus haemorrhoidalis*	6.0	–	–	–	13	9	0	0	0	12	2
–	*Agabus* sp. (indet. larvae)	3.6	8	–	–	4	–	5	0	0	1	0
Common	*Agabus sturmii*	15.7	4	33	–	26	13	1	8	0	14	6
Common	*Agabus bipustulatus*	57.8	60	22	67	52	74	169	4	3	44	50
Scarce B	*Agabus conspersus*	50.6	52	44	33	30	74	81	7	4	16	60
Common	*Agabus nebulosus*	21.7	28	–	–	9	39	11	0	0	7	33
(Local)	*A. nebulosus*/ *conspersus* (larvae)	16.9	16	–	33	4	35	65	0	1	4	41
–	*Ilybius* sp. (indet. larvae)	7.2	12	–	–	9	4	3	0	0	3	1
Common	*Ilybius ater*	3.6	8	–	–	4	–	3	0	0	1	0
Common	*Ilybius fuliginosus*	1.2	–	11	–	–	–	0	1	0	0	0
Common	*Ilybius quadriguttatus*	18.1	16	22	–	30	9	9	3	0	10	2
(Scarce B)	*Rhantus* sp. (indet. larvae)	1.2	4	–	–	–	–	1	0	0	0	0
Scarce B	*Rhantus suturalis*	16.9	24	11	–	13	17	15	1	0	7	7
Scarce B	*Rhantus frontalis*	42.2	36	–	67	35	70	39	0	3	54	50
Common	*Colymbetes fuscus*	47.0	56	22	33	35	61	83	3	1	19	46
Scarce B	*Hydaticus seminiger*	1.2	4	–	–	–	–	2	0	0	0	0
–	*Dytiscus* sp. (larvae)	31.3	28	22	–	22	52	13	3	0	12	28
Scarce B	*Dytiscus circumflexus*	2.4	4	11	–	–	–	1	1	0	0	0
–	*Gyrinus* sp. (larvae)	1.2	–	–	–	–	4	0	0	0	0	1
Common	*Gyrinus substriatus*	2.4	–	–	–	4	4	0	0	0	1	5
–	Hydraenidae larvae indet.	3.6	4	–	–	4	4	1	0	0	1	1
RDB3	*Aulacochthebius exaratus*	1.2	4	–	–	–	–	1	0	0	0	0
Scarce B	*Ochthebius viridis*	7.2	16	–	–	4	4	9	0	0	1	1
Scarce B	*Ochthebius marinus*	2.4	4	11	–	–	–	1	2	0	0	0
Local	*Ochthebius dilatatus*	15.7	36	11	–	13	–	24	1	0	5	0
Common	*Ochthebius minimus*	33.7	56	–	–	39	22	427	0	0	45	9
Scarce B	*Hydraena testacea*	6.0	12	11	–	4	–	27	1	0	1	0
Scarce B	*Limnebius nitidus*	1.2	4	–	–	–	–	1	0	0	0	0
Scarce B	*Limnebius papposus*	1.2	–	–	–	4	–	0	0	0	1	0
–	*Helophorus* sp. (larvae)	9.6	12	–	–	13	9	3	0	0	10	2
Common	*Helophorus aequalis*	18.1	16	11	–	9	35	4	1	0	4	12
Common	*Helophorus brevipalpis*	47.0	36	44	33	35	74	12	5	1	36	65
Scarce B	*Helophorus nanus*	10.8	20	11	–	9	4	7	1	0	5	1
Scarce B	*Helophorus fulgidicollis*	10.8	8	11	–	22	4	8	1	0	16	1
–	*Helophorus minutus* group	6.0	8	–	–	9	4	2	0	0	2	1
Common	*Helophorus minutus*	8.4	20	–	–	–	9	7	0	0	0	2
Scarce B	*Helophorus griseus*	2.4	–	–	–	–	9	0	0	0	0	2
Common	*Helophorus obscurus*	4.8	4	–	–	9	4	2	0	0	4	1
–	Hydrophilidae larvae indet.	77.1	60	44	100	83	100	125	24	17	475	528
Common	*Hydrobius fuscipes*	72.3	72	44	33	70	91	161	55	1	207	139

Status	Taxon	Overall % (n=83 sites)	% of sites by compartment					Total number recorded/estimated				
			R	SLD	SM	W	A	R	SLD	SM	W	A
Scarce B	*Limnoxenus niger*	4.8	–	–	–	4	13	0	0	0	1	4
Common	*Cymbiodytella marginella*	42.2	48	22	33	57	30	125	44	1	49	38
RBD2	*Hydrophilus piceus*	4.8	–	11	–	–	13	0	1	0	0	14
Common	*Anacaena limbata*	54.2	76	22	33	65	35	230	15	1	197	22
Common	*Anacaena globulus*	14.5	28	11	–	4	13	16	5	0	1	5
Common	*Anacaena lutescens*	1.2	4	–	–	–	–	1	0	0	0	0
Scarce B	*Anacaena bipustulata*	1.2	4	–	–	–	–	1	0	0	0	0
Common	*Coelostoma orbiculaire*	1.2	4	–	–	–	–	1	0	0	0	0
–	*Cercyon* sp. (terrestrial)	2.4	8	–	–	–	–	2	0	0	0	0
Scarce B	*Cercyon tristis*	10.8	24	–	–	9	4	10	0	0	4	2
Scarce B	*Cercyon sternalis*	19.3	20	11	33	26	13	85	2	1	14	3
Local	*Cercyon convexiusculus*	7.2	16	11	–	–	4	27	4	0	0	1
Local	*Cercyon marinus*	7.2	12	–	–	13	–	20	0	0	3	0
Local	*Cercyon terminatus*	1.2	–	–	–	–	4	0	0	0	0	1
(Local)	*Helochares* sp. (larvae)	1.2	–	11	–	–	–	0	1	0	0	0
Local	*Helochares lividus*	8.4	24	–	–	–	4	15	0	0	0	2
Common	*Laccobius minutus*	2.4	4	–	–	–	4	1	0	0	0	1
Common	*Laccobius bipunctatus*	7.2	20	–	–	4	–	43	0	0	1	0
(Local)	*Enochrus* sp. (larvae)	6.0	–	22	–	13	–	0	10	0	11	0
Scarce B	*Enochrus quadripunctatus*	1.2	–	–	–	–	4	0	0	0	0	1
Scarce B	*Enochrus bicolor*	7.2	–	22	33	4	9	0	4	1	2	6
Scarce B	*Enochrus melanocephalus*	6.0	12	22	–	–	–	8	2	0	0	0
Local	*Enochrus testaceus*	14.5	28	11	–	9	9	15	2	0	4	2
Scarce A	*Enochrus halophilus*	14.5	8	22	67	9	17	2	6	4	2	14
(Scarce B)	*Berosus* sp. (larvae)	18.1	4	–	67	9	39	4	0	4	3	44
Scarce B	*Berosus affinis*	1.2	4	–	–	–	–	1	0	0	0	0
Scarce B	*Berosus signaticollis*	7.2	–	–	–	4	22	0	0	0	4	6
–	Scirtidae (larvae)	21.7	20	11	67	30	13	49	4	2	31	24
–	*Cyphon* sp. (larvae)	2.4	–	–	–	9	–	0	0	0	11	0
Local	*Cyphon laevipennis*	8.4	8	22	33	–	9	2	3	1	0	2
Common	*Microcara testacea*	7.2	12	–	–	13	–	30	0	0	5	0
–	*Dryops* sp. (larvae)	1.2	–	–	–	–	4	0	0	0	0	3
–	Elateridae (larvae)	4.8	–	–	–	4	13	0	0	0	1	7
–	Carabidae (unidentified)	2.4	8	–	–	–	–	14	0	0	0	0
Local	*Amara convexiuscula*	1.2	–	–	–	4	–	0	0	0	1	0
Common	*Amara ovata*	1.2	–	–	–	4	–	0	0	0	1	0
Local	*Agonum thoreyi*	1.2	–	–	–	4	–	0	0	0	1	0
Common	*Pterostichus diligens*	1.2	4	–	–	–	–	4	0	0	0	0
Common	*Pterostichus nigrita*	2.4	4	–	33	–	–	1	0	1	0	0
Scarce A	*Harpalus melleti* ? (no abdomen)	1.2	4	–	–	–	–	1	0	0	0	0
Local	*Dyschirius globosus*	1.2	–	–	–	4	–	0	0	0	1	0
Local	*Dyschirius salinus*	1.2	–	–	33	–	–	0	0	1	0	0
Scarce A	*Bembidion semipunctatum*	9.6	16	–	–	17	–	6	0	0	6	0
Common	*Bembidion assimile*	4.8	8	–	–	9	–	2	0	0	2	0
Common	*Demetrias atricapillus*	3.6	4	11	–	4	–	1	1	0	1	0
–	Staphylinidae (unidentified)	8.4	28	–	–	–	–	83	0	0	0	0
Local	*Stenus cicindeloides*	4.8	8	–	–	–	9	3	0	0	0	4
Common	*Stenus juno*	1.2	4	–	–	–	–	2	0	0	0	0
Common	*Anotylus rugosus*	2.4	8	–	–	–	–	3	0	0	0	0
Local	*Tachyporus pallidus*	1.2	–	–	–	4	–	0	0	0	1	0
Common	*Agriotes sputator*	3.6	4	11	–	4	–	1	1	0	1	0
Local	*Malachius viridis*	2.4	–	–	–	4	4	0	0	0	1	1
–	Nitidulidae (unidentified)	6.0	20	–	–	–	–	6	0	0	0	0
–	*Meligethes* sp.	1.2	–	–	33	–	–	0	0	1	0	0
Common	*Meligethes viridescens* ?	1.2	–	–	–	4	–	0	0	0	1	0

Status	Taxon	Overall % (n=83 sites)	% of sites by compartment					Total number recorded/estimated				
			R	SLD	SM	W	A	R	SLD	SM	W	A
Common	*Meligethes aeneus*	4.8	–	11	33	4	4	0	2	2	1	1
Common	*Meligethes nigrescens* ?	2.4	4	–	–	–	4	1	0	0	0	1
Common	*Brachypterus glaber*	4.8	–	–	–	4	13	0	0	0	1	4
Common	*Brachypterus urticae*	1.2	–	–	–	–	4	0	0	0	0	1
Local	*Stilbus oblongus*	3.6	4	–	33	4	–	2	0	1	3	0
RBDK	*Olibrus flavicornis*	1.2	4	–	–	–	–	1	0	0	0	0
Common	*Rhizobius litura*	2.4	–	–	–	4	4	0	0	0	4	1
Common	*Coccidula rufa*	15.7	12	–	–	22	22	6	0	0	8	6
Local	*Coccidula scutellata*	4.8	4	–	67	–	4	1	0	2	0	1
Common	*Coccinella 7–punctata* ? (larvae)	1.2	–	–	–	4	–	0	0	0	1	0
Common	*Subcoccinella 24–punctata*	1.2	–	–	–	–	4	0	0	0	0	2
Local	*Micraspis 16–punctata*	6.0	–	11	–	9	9	0	3	0	4	2
Local	*Anisosticta 19–punctata*	1.2	–	–	–	4	–	0	0	0	1	0
Common	*Corticaria crenulata*	2.4	–	–	33	4	–	0	0	1	1	0
Common	*Corticaria impressa*	1.2	4	–	–	–	–	1	0	0	0	0
Common	*Corticaria gibbosa*	1.2	4	–	–	–	–	1	0	0	0	0
Common	*Enicmus transversus*	2.4	–	–	–	9	–	0	0	0	2	0
Common	*Psylliodes affinus*	1.2	–	–	–	4	–	0	0	0	1	0
Local	*Psylliodes dulcamarae*	1.2	–	–	–	4	–	0	0	0	1	0
Local	*Phyllotreta consibrina*	2.4	–	11	–	4	–	0	1	0	1	0
Local	*Chaetocnema arida*	1.2	–	–	–	4	–	0	0	0	1	0
–	Chrysomelidae (indet. larvae)	10.8	12	–	33	9	13	6	0	1	4	3
Common	*Phaedon cochleariae*	1.2	4	–	–	–	–	3	0	0	0	0
Local	*Donacia vulgaris*	1.2	–	–	–	–	4	0	0	0	0	1
Local	*Apthona euphorbiae*	1.2	–	–	–	–	4	0	0	0	0	2
Common	*Prasocuris phellandrii*	1.2	–	–	–	–	4	0	0	0	0	1
–	Curculionidae (indet. larvae)	4.8	16	–	–	–	–	13	0	0	0	0
Scarce B	*Otiorhynchus rauceus*	1.2	–	–	–	–	4	0	0	0	0	1
Scarce B	*Notaris scirpi*	1.2	–	–	–	–	4	0	0	0	0	1
Common	*Notaris acridulus*	1.2	–	–	–	4	–	0	0	0	1	0
Naturalized	*Stenopelmus rufinasus*	4.8	–	11	–	13	–	0	1	0	4	0
Common	*Ceutorhynchus contractus*	1.2	–	11	–	–	–	0	1	0	0	0
Common	*Barypeithes pellucidus*	25.3	4	–	33	39	43	8	0	1	36	32
Local	*Cantharis lateralis*	1.2	–	–	–	4	–	0	0	0	2	0
Local	*Cantharis pallida*	1.2	4	–	–	–	–	1	0	0	0	0
Common	*Rhagonycha fulva*	1.2	4	–	–	–	–	1	0	0	0	0
Local	*Rybaxix laminata/longicornis*	1.2	4	–	–	–	–	1	0	0	0	0
Common	*Limnephilus lunatus*	1.2	–	–	–	4	–	0	0	0	1	0
Common	*Limnephilus flavicornis*	3.6	–	–	–	9	4	0	0	0	5	1
Common	*Limnephilus marmoratus*	3.6	–	–	–	13	–	0	0	0	7	0
Common	*L.flavicornis/marmoratus* (p.)	2.4	–	–	–	9	–	0	0	0	3	0
Common	*Limnephilus incisus/affinis*	4.8	–	–	–	–	17	0	0	0	0	5
Common	*Oecetis lacustris* ? (pupa)	1.2	–	–	–	4	–	0	0	0	1	0
Common	*Sialis lutaria*	3.6	12	–	–	–	–	31	0	0	0	0
–	Tipulidae	1.2	–	–	–	4	–	0	0	0	1	0
–	*Tipula* sp.	7.2	8	11	–	–	13	2	1	0	0	3
Local	*Nigrotipula nigra*	1.2	–	–	–	4	–	0	0	0	1	0
Common	*Tipula paludosa*	6.0	16	–	–	–	4	9	0	0	0	2
Local	*Tipula pierrei*	3.6	4	11	–	4	–	1	1	0	1	0
–	*Tipula oleracea* group	15.7	16	11	–	13	22	12	4	0	7	12
–	*Pilaria nemoralis* group	2.4	–	–	–	9	–	0	0	0	13	0
–	*Ormosia* sp.	19.3	12	11	–	17	35	3	1	0	175	22
–	*Erioptera* sp.	1.2	–	–	–	–	4	0	0	0	0	1
–	*Pericoma* sp.	1.2	–	11	–	0	–	0	3	0	0	0
–	*Pericoma trivialis* group	9.6	4	11	–	9	17	2	1	0	5	32

Status	Taxon	Overall % (n=83 sites)	% of sites by compartment					Total number recorded/estimated				
			R	SLD	SM	W	A	R	SLD	SM	W	A
–	*Psychoda* sp.	3.6	12	–	–	–	–	17	0	0	0	0
Unknown	*Psychoda cinerea*	1.2	–	11	–	–	–	0	3	0	0	0
Unknown	*Psychoda alternata* ?	2.4	–	–	–	4	4	0	0	0	1	2
Unknown	*Psychoda severini* ?	2.4	4	–	–	4	–	1	0	0	1	0
(Local)	*Dixella attica/autumnalis*	26.5	16	22	33	39	26	82	6	2	114	9
Local	*Dixella attica*	1.2	–	–	–	4	–	0	0	0	5	0
Local	*Dixella autumnalis*	1.2	4	–	–	–	–	5	0	0	0	0
Unknown	*Chaoborus crystallinus*	14.5	48	–	–	–	–	1,376	0	0	0	0
Unknown	*Chaoborus flavicans*	1.2	4	–	–	–	–	1	0	0	0	0
–	Culicidae indet. (pupa)	10.8	12	11	–	9	13	13	1	0	7	39
–	*Culex* sp.	20.5	40	–	–	4	26	2,766	0	0	750	254
–	*Culiseta annulata* group	28.9	52	–	–	22	26	1,009	0	0	15	198
–	*Anopheles maculipennis* agg.	2.4	–	–	–	–	9	0	0	0	0	2
Common	*Anopheles claviger*	1.2	–	–	–	4	–	0	0	0	1	0
–	Chironomidae	97.6	96	100	100	96	100	28,089	4,820	1,250	10,044	25,850
–	Ceratopogonidae	13.3	8	22	33	4	22	8	38	15	15	59
(Scarce B)	*Stratiomys* sp.	3.6	8	–	–	–	4	3	0	0	0	1
Scarce B	*Stratiomys singularior*	4.8	–	–	–	4	13	0	0	0	1	3
(Local)	*Nemotelus uliginosus/notatus*	6.0	–	–	67	13	–	0	0	4	6	0
Local	*Nemotelus uliginosus*	3.6	–	–	33	–	9	0	0	1	0	24
Local	*Oplodontha viridula*	21.7	8	44	–	26	26	2	13	0	10	35
Local	*Oxycera nigricornis*	1.2	–	–	–	4	–	0	0	0	1	0
Common	*Chloromyia formosa*	2.4	–	–	–	4	4	0	0	0	1	1
Common	*Microchrysa polita*	1.2	–	–	–	–	4	0	0	0	0	1
–	Dolichopodidae	12.0	4	11	–	9	26	1	2	0	10	130
–	Syrphidae indet.	13.3	4	11	–	13	26	1	15	0	11	29
–	*Eristalis* group	6.0	20	–	–	–	–	52	0	0	0	0
Local	*Ptychoptera lacustris*	1.2	4	–	–	–	–	2	0	0	0	0
Local	*Ptychoptera contaminata*	3.6	–	–	–	4	9	0	0	0	1	4
–	Ephydridae indet.	44.6	20	11	100	52	70	47	3	10	171	258
–	*Scatella* sp.	3.6	8	–	–	4	–	2	0	0	1	0
–	*Ephydra* sp.	14.5	16	11	67	4	17	40	350	2	2	48
–	*Hydrellia* sp.	1.2	–	–	–	4	–	0	0	0	1	0
–	*Tetanocera* sp.	22.9	20	33	–	26	22	10	4	0	8	50
–	*Elgiva* sp.	3.6	–	11	–	9	–	0	3	0	3	0
–	Chloripidae indet.	22.9	12	11	–	17	48	37	1	0	6	148
–	*Oscinella* sp.	9.6	–	22	–	9	17	0	7	0	3	10
–	Calliphoridae	1.2	–	–	–	4	–	0	0	0	3	0
–	*Fannia* sp.	2.4	4	11	–	–	–	1	1	0	0	0
–	*Lispe* sp.	8.4	4	–	–	4	22	4	0	0	1	52
–	Tabanidae	1.2	4	–	–	–	–	1	0	0	0	0
–	Cecidomyiidae	1.2	–	11	–	–	–	0	3	0	0	0
–	Anthomyzidae	2.4	4	11	–	–	–	1	6	0	0	0
–	Indet. Diptera	21.7	20	11	67	26	17	5	2	2	11	20
								71,853	16,099	5,694	46,889	94,073

Book reviews

Keys to the freshwater fish of Britain and Ireland, with notes on their distribution and ecology. Peter S. Maitland. 2004. 245 pp. Freshwater Biological Association Scientific Publication No. 62. £22. ISBN 0 900386 71 1, ISSN 0367 1887.

Peter Maitland's previous key to the freshwater fish fauna of Britain and Ireland has been an essential and much-thumbed text in the personal library of most freshwater biologists since it was published in 1972. The species composition and distribution of our freshwater fish fauna has changed, however, due to extinctions, introductions such as sunbleak and topmouth gudgeon, and changes in classification. It was a pleasure, therefore, to review the new updated edition which provides more extensive detail on fish structure, collection and preservation, and new sections on legislation and conservation status. The checklist is comprised of fifty-seven species of freshwater fish now established in Britain and Ireland, but keys for identifying sixty-seven species of adult fish in twenty-three families are provided to include some closely related non-indigenous fish species for comparison where appropriate. In addition, keys to family-level are given for identifying the eggs, post-larval stages and scales of adult fish. Distribution maps divided into hydrometric (river catchment) areas and notes on ecology, distribution and conservation status of each listed fish are extremely useful. A selected bibliography for each species is also welcome, but it is extremely difficult to read the references section at the end of the book due to the use of a block format, presumably to save space. This is a minor criticism, however, for what will be the new definitive text for identifying the freshwater fish of Britain and Ireland.

RUTH KIRK

Two further FBA publications have been received this autumn: Scientific Publication No. 63 — *A new key to the freshwater bryozoans of Britain, Ireland and Continental Europe,* by Timothy S. Wood and Beth Okamura, £16; and Special Publication No. 13 — *A guide to the identification of genera of chironomid pupal exuviae occurring in Britain and Ireland (including common genera from northern Europe) and their use in monitoring lotic and lentic fresh waters,* by Ronald S. Watson and Leslie P. Ruse, £20.

These fully illustrated titles continue the FBA's clear system of covering the subjects through their morphology, life history, ecology, collection, laboratory techniques and identification. Whilst the biology of the bryozoans (moss animals) and chironomids (dancing midges) form excellent subjects for study by the all-round naturalist *per se,* both groups are valuable indicators of water quality and these are welcome additions to the authoritative FBA 'library'. Ed.

Bug athletes, Bug hunters, Bugs that build, Poisonous bugs, Water bugs. All texts by Barbara Taylor, being five titles in the Bug Zone series from Chrysalis Children's Books, published originally in hardback in 2003 and now, 2005, in paperback, each 32 pp., large quarto, £5.99.

Bug athletes, ISBN 1 84458 265 5, ranges from 'sprint champions' — cockroaches, sun spiders and tiger beetles, 'Spider gymnasts' — jumping spiders, 'Wonder walkers' — centipedes and millipedes, 'Long jumpers' — grasshoppers, locusts and crickets, 'High jumpers' — fleas and springtails, to 'Super swimmers' — great diving beetles.

Bug hunters, ISBN 1 84458 266 3, contains fine pictures of spiders, robber flies, diving and ground beetles, mantises, antlions, scorpions, assassin bugs and more.

Bugs that build, ISBN 1 84458 267 1, covers termites, spiders' webs, wasps' paper nests, honeycomb, leaf-weaving ants, wood ant colonies, spider 'cities' and terrestrial burrows.

Poisonous bugs, ISBN 1 84458 268 X, covers venom from spiders to scorpions, poisons injested by, for instance, the larva of the monarch butterfly, poisonous claws of centipedes, bee and wasp stings and poisonous hairs on some caterpillars and spiders.

Water bugs, ISBN 1 84458 269 8, covers water fleas, dragonflies, diving beetles, mayflies, mosquitoes, caddis flies, spiders, pond skaters, water boatmen and water scorpions.

Each book has one or more colour photographs on each main page of the text and, at the end, two pages of 'Words to remember' followed by an index. The term 'bug' is used in the chiefly North American context meaning any kind of minibeast. The books are printed on heavy glazed paper making them excellent sources of information for young, even pre-school, children and, of course, their parents.

K. H. HYATT

Spiders from pitfall-traps as indicators of grassland conservation value

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Abstract

Ground-active spiders at grassland sites in the London area have been sampled using standard trios of pitfalls for 12-month continuous periods. Such data has been built up from more than fifty grassland sites. For several sites at Hampstead Heath a number of 12-month samples have been obtained from the same sites over a number of years.

A number of indices are proposed to assess the relative conservation value of the sites and to monitor change. Individual species have been allocated a **BMS (Biodiversity Matrix Score)** based on national status, habitat profile and recorded occurrence in the London area. Sites then are characterized by standard scores based on 12-month samples: T (total numbers trapped), S (No. of species), S1 and S2 (weighted species scores using BMS numbers), and a proposed **GCV (Grassland Conservation Value).** Previously defined indices such as **CI (Conservation Index)** are also calculated for the sites sampled. Using the indices, some comparisons of sites are discussed and changes over the last few years to several sites on Hampstead Heath are noted.

KEYWORDS: spiders, spider ecology, pioneer species, Biodiversity Matrix Score, Grassland Conservation Value, grassland management, grassland indicators, ecological indicators.

Introduction

Can spider assemblages as sampled in pitfall traps be used to indicate the quality of grasslands or their conservation value in a standardized way? If so, how could spider monitoring provide a simple means of evaluating changes in the management of grassland?

Land managers are increasingly required to produce measurable effects, and Environmental Management Systems (EMS) characterized by Standards such as ISO 14001 are 'increasingly being used by industry . . . (to monitor) . . . its sites and activities' (Callow 2000). ISO14001 is a standard 'applicable to any organization that wishes to: implement, maintain and improve an environmental management system; assure itself of its conformance with its own stated . . . policy; demonstrate conformance, etc.' (Anon. 1996).

This approach typically uses a Biodiversity Assessment Matrix for monitoring standards typically based on easily observed taxa such as birds and butterflies. It is proposed that spiders could also be used in such systems and may act as indicators for the health of the ground-living invertebrate fauna in general.

There have been attempts at ranking the quality of a habitat at different locations by writers working with other taxa. Coleoptera associated with dead wood habitats have been compared using a Saproxylic Quality Score (SQS)

devised by Fowles and others (Fowles 1997, Fowles et al. 1999) by which species are given 'rarity scores' based on their national conservation status, and these are totalled for each site. As there appears to be a 'rarity association' where such species tend to be found at the same site, a second index called a Saproxylic Quality Index is produced by dividing the SQS by the total number of dead wood species found (including common species) and this score being multiplied by 100.

It is proposed that ground-active spiders (i.e. those sampled by pitfalls) found in grassland may each be allocated a Biodiversity Matrix Score made up of three components based on (1) National Conservation Status, (2) known distribution in the London region, and (3) recorded habitat preference as sketched by Harvey et al. (2002) in the *Provisional atlas of British spiders*. Once BMS scores are aggregated for all species trapped by a standard pitfall-trapping regime for a 12-month period, there is a possibility of comparing different sites, and comparing conditions at a particular site over successive years. This may be particularly useful in assessing the effects of different methods of grassland management, and especially the role of disturbance and its influence on the spider fauna.

Disturbance

An ecological theory developed by Grime (1974, 1979) and his team of botanists at Sheffield University proposed that organisms pursue different life strategies which are the product of three dimensions: *competition, environmental stress* and *disturbance*. This analysis has subsequently been found useful by biologists working with various groups of both animals and plants and it has been proposed by the writer to interpret data obtained for spiders from Oxleas Wood (Milner 1988). Disturbance in this context is taken to mean active destruction of habitat, which may be caused by natural processes such as inundation, landslip, grazing, etc., and by human activities such as trampling and mowing.

The effects of disturbance on spider faunas have been discussed previously by a number of authors including Alderweireldt (1993, 1994 etc.), Duffey (1993) (who pointed out that species preferring open ground conditions had greatly expanded their range in man-made habitats in response to increased disturbance) and Milner (1993, 2000). Some spiders have clearly adapted better to regularly disturbed man-made habitats better than others; Alderweireldt found that several linyphiids, in particular *Oedothorax* spp., *Erigone* spp., *Milleriana inerrans*, *Lepthyphantes tenuis* and *Bathyphantes gracilis* were among the most abundant species in agricultural fields in Belgium and seemed to cope with the high level of disturbance the best. *Erigone* spp. spin small webs and he discovered by laboratory observations that the three *Oedothorax* spp. (*O. fuscus*, *O.retusus* and *O. apicatus*) frequently spun no web at all but caught their prey directly.

Pitfall data from a number of regularly mown sites at Hampstead Heath in years after the mowing regimes were relaxed suggests that without regular disturbance several pioneer species quickly fall in numbers to be replaced by larger numbers of typical grassland species (Milner 1993).

London grasslands

In the London area most grasslands are subject to intense pressure from disturbance by trampling and mowing, as well as suffering continuous deposition of additional nutrients especially by dogs, or applied as fertilizer by land managers. Good quality semi-natural grassland in the south-east of England has a diverse spider fauna; the least-disturbed and oldest stretches of grassland in London approximate to good grassland habitat in other parts of England. However changes in grassland management, which have been

observed over time at various places on Hampstead Heath, do suggest that intervention can have positive as well as negative effects on the spider fauna, and by implication, affect the rest of the invertebrate fauna of grasslands in the area.

Pitfall traps have been used to sample ground-active spiders over continuous 12-month periods, using standard trios of traps (Milner 1987) for similar total numbers of trap-days (approx. 365 × 3 = 1,095) for each sample. Such standardized trapping has been conducted at numerous sites around London in the last fifteen years and the data collected has been the basis of the following discussion and proposals.

Invertebrates and grassland

Changes to grassland under different management regimes are familiar. Old, long-established grassland can be rapidly 'improved' for grazing cattle or sheep by the application of fertilizers and by reseeding with fast-growing grasses, or turned into hay meadows and machine-mown. Light to moderate grazing (as opposed to overgrazing) by sheep, cattle or rabbits can produce good structural variation in the vegetation because all grazing animals are to some extent selective in the plants they eat. Sheep and cattle also have a beneficial effect by leaving hoof-marks in softer ground. When pastures are abandoned or mowing stopped, artificial pastures may gradually revert to a more natural state, but without grazing these areas will naturally revert to woodland. Other areas such as playing fields or allotments can be allowed to revert (with the same proviso), while many urban grasslands accumulate additional nitrogen deposited from the atmosphere and from dogs, a process which encourages vigorous grasses and suppressing finer slow-growing species. The latter process can be seen in many public open spaces in London where the grass areas bordering major paths are dominated by vigorous species such as *Dactylus glomeratus* while finer slow-growing species such as *Festuca* spp. are only found some metres away from the path. The process has been reported in the London area using soil analysis, by Shaw et al. (1995).

Machine-mowing (for hay-making or general tidying) compresses and homogenizes grassland into what Eric Duffey (1993) has referred to as a 'recreation-ground habitat'. Relaxing such mowing regimes, such as by the reintroduction of grazing or by replacing machine mowing with hand-held strimmer use, results in increased micro-topographical diversity such as the re-establishment of tussocks and building of anthills by meadow ants *Lasius flavus*, and the development of smaller irregularities by the activities of various animals large and small, all characteristics of unmown natural or seminatural grasslands. These features are important for the diversity of invertebrate life to flourish and Kirby (2001: 47–72) has indicated that invertebrate faunas in grassland are best served if the diversity of the habitat can be enhanced or maintained and that this should be a primary aim of management for conservation.

Exactly how and why one stretch of grassland is attractive to some spider species and not to others is not well understood, but the level of disturbance due to trampling, mowing, etc. is clearly an important factor although it is difficult to quantify accurately. In this report, machine mowing more frequently than once a year is taken as heavy disturbance, as is frequent trampling. Medium levels of disturbance is assumed if mowing is less frequent than annually or mowing with strimmers etc., while low levels of disturbance assume no annual mowing for at least the previous twelve months.

Those linyphiid spiders that are common in agricultural land (*Oedothorax fuscus*, *Erigone* spp. etc.) clearly thrive under conditions of high disturbance, frequently reaching high densities (Alderweireldt 1993), where spiders which depend on webs are at a disadvantage. Other species such as the crab spider *Xysticus cristatus* spin no web, while several lycosids, common in grassland, hunt by sight. These species are among the commonest spiders found in

grasslands in the London area, *Oedothorax* spp. and *Erigone* spp. reaching very large numbers even in some of the most disturbed grassland habitats.

Spiders exhibit a variety of life strategies and this enquiry is concerned with ground-active species, which can be sampled using pitfall-traps. However, grassland management also profoundly affects the suitability of the habitat for other species such as large orb-web spiders, but it is more difficult to obtain standardized data for such species. Sweep-netting is hardly a quantitative procedure and careful inspection of an entire area is tedious, time-consuming and subjective. However, this latter approach has been used by the writer to document details of large orb-web spiders in the Ladies' Swimming Pool Meadow, Hampstead (Milner 2001, 2002, unpubl. reports for Corporation of London) since mowing of the sward was terminated some years ago. As a result, areas of tall herbs and grass tussocks have developed and this has provided the habitat for increased numbers of species such as *Araneus quadratus* and *Larinioides cornutus*. However, changes to the ground-living fauna on this meadow have yet to be recorded as pitfall-trapping has only been conducted so far for one season. In other parts of the Heath trapping has been conducted for several years and in most cases this has coincided with reductions in mowing.

Grassland species in pitfall samples in the London area

Since 1987 the writer has conducted pitfall surveys producing standard 3-trap 12-month samples from over a hundred sites in the London area, of which over fifty are grassland sites (excluding grassy sites inside woodland). A report on the findings from eighty-two separate 12-month samples from a variety of habitats including grassland, up to 1999, was published in this journal (Milner 2000); since then standard samples from further sites have been completed. There is now reasonable spread over London (although there are fewer grasslands in the south and south-east of the area). In addition, at some trap sites such as Hampstead Heath, several 12-month samples have been obtained in various years during the period 1991 to 2002, providing a record of changes in the spider fauna during that time.

Important ground-living grassland specialist species have survived in the London area in some of the less-disturbed and less-altered stretches of grassland; examples include *Atypus affinis* (in London this is effectively a grassland species in the absence of heathland) only found on steep unmown slopes at Hampstead Heath and more recently on Blackheath (Milner 2004); *Tapinocyboides pygmaeus* on least mown or unmown parts of Hampstead Heath; *Enoplognatha oelandica* on less mown relic heathy grassland in one corner of Alexandra Park; *Haplodrassus signifer* on relic acid grassland at Harmondsworth Moor (and some other sites).

From the list of species that have occurred in pitfall traps in London grassland sites, those species known to be active at ground-level in grassland are listed in Table 1.

As the purpose of this enquiry is to identify those species whose occurrence or absence from 12-month pitfall samples can be used to assess grassland quality, a number of species are excluded. Some species that live well above ground in tall grasses etc., (such as *Tetragnatha* spp., *Pisaura mirabilis*, *Larinioides cornutus, Tibellus oblongus)* are excluded, as their occurrence in pitfalls is inevitably erratic. Species that are not associated particularly with grassland are excluded unless they are known to be pioneers or opportunistic species exploiting disturbance in grassland habitats. Also excluded are species which are characteristic of other habitats such as woodland or wetland but which are occasionally be found in grassland bordering these habitats.

Taking Duffey's (1993) proposed gradation of strategy from narrow grassland specialist to generalist and to open ground/disturbed habitat pioneer, a scoring system is proposed. There are three components which together are

aggregated. These are: (1) National Conservation Status (as used by Harvey et al. 2001); (2) a spider habitat preference score based on the habitat profiles given in the *Provisional atlas of British spiders* (Harvey et al. 2002); and (3) recorded occurrence in the London region up to 2003 (as defined by the counties of London and Middlesex and including Richmond Park) (Milner 1999 and subsesquent unpublished records).

For (1) above the scoring follows that adopted by coleopterists (e.g. Fowles 1997) and ranges from 0 for common species, and 2 for species which are regarded as 'Local', 4 for Notable B species or nationally Scarce, 8 for nationally Notable A species and 16 for *Red Data Book* species. The scoring for habitat is more subjective but is based on the habitat profiles in the *Provisional atlas* with grassland specialists scoring 2, what may be termed grassland generalists scoring 1, generalists scoring zero and pioneers scoring from –1 to –3. This is partly based on observations of species occurrence in relation to disturbance in pitfall samples in the London area as discussed by the author previously (Milner 2000).

Species whose numbers have been observed to peak (taking average numbers for a 12-month sample per site) in the high disturbance sites have been allocated the –3 score, but species such as *Pachygnatha degeeri* and *Bathyphantes gracilis* which both occur in significant average numbers in undisturbed grasslands, are given zero scores. The species scoring –3 are absent from most undisturbed sites, or occur as very low numbers, 1 or 2 in a 12-month sample. Among lycosids, while it is possible to separate *Pardosa palustris, Alopecosa pulverulenta* and *Pardosa pullata* by estimated disturbance level of site, the differences are small (see Table 1). In highly disturbed London sites even *P. palustris* may be absent or occurs in small numbers. However for smaller pioneers such as *Erigone dentipalpis*, *Oedothorax fuscus* and *Milleriana inerrans* Table 1 suggests that the most disturbed habitats are the most attractive.

BMS scores produced by aggregating the three components are given in Table 2. The species have been grouped as follows (and following Duffey, 1993): narrow grassland specialists (34 spp. Table 2A); grassland species associated with ants (4 spp. Table 2B); species found most commonly in grassland but also in some other habitats (47 spp. Table 2C); and finally pioneers and ruderal species found in grassland but common in disturbed habitats (20 spp. Table 2D).

From Table 2 it can be seen that the two species assigned the highest BMS scores are both *Red Data Book* species (*E.oelandica* and *T.pygmaeus*), while the three Nationally Notable species score 6 or 7. *Mioxena blanda* also scores 6 (while not regarded as a grassland specialist nationally, in the London area it has only been found in old grassland). A number of species in the grassland specialist list are fairly common nationally but uncommon in the London area; examples are *Agyneta decora* and *Haplodrassus signifer*. At the other extreme several ruderal species are commonly found in the more disturbed grasslands in London (but not or hardly in the old grasslands), in particular the five 'opportunistic' species including in the W category in Table 3, and these are assigned negative scores.

List of sites trapped to give 12-month samples

In each case the identifier used by the writer is given first, followed by a name for the site and the date of the first standard 12-month sample is given in brackets. In each case the first number is the reference number for this particular 12-month sample (184 in the first sample).

Short grass sites (main sward up to 10 cm)

184 'BAA14' (meadow): Camp 4 Conservation Site (2003–2004)
This site is a diverse unimproved meadow on a very nutrient-poor and well-drained substrate that appears to be mostly old cinders. It has been mown occasionally but is not trampled as the site is closed to the public.

168 'GP006': Blackheath (2003–2004)
A diverse unimproved sward on a gravelly, nutrient-poor soil around old gravel-pits. Subject to occasional fires, unmown, but lightly trampled (open to the public).

2 'Yew': Brompton Cemetery (1995)
This site is on the eastern side of the cemetery among a diverse sward of native grasses including *Festuca* spp. It is not heavily trampled but appears to be cut on a regular basis by cemetery gardeners using a strimmer; probably this has replaced shears but it appears that the cutting of the sward has always been maintained.

196 '006' Area 4: Harmondsworth Moor (2002–2003)
A gravelly bank at the edge of a reseeded meadow, sparsely grassed, unmown.

117 '043': Springwell Lane Chalkpit, Hillingdon (2002)
This site is in a diverse grass sward with many other small flowering plants well grazed by rabbits, at Springwell Lane Chalkpit, near Harefield.

178 'BAA06': Two Bridges Farm Conservation Area (2002–2003)
This site is in fine natural grasses (mostly *Agrostis* spp.) on unimproved meadowland, but is regularly mown and very lightly trampled.

13 'Open': Barnes Common (1990)
This site is in an open area of the dense sward of neutral grassland at Barnes Common. The area is unmown, lightly grazed by rabbits, and not heavily trampled. It appears to be one of the few relics of ancient pastureland within London.

140 '023': Springwell Lane Chalkpit, Hillingdon (2002)
This is very similar to '043' (above), but is at the top of the chalkpit.

1 'Oak': Brompton Cemetery (1995)
A similar site to the above 'Yew' but on the west side of the cemetery near some yew trees.

149 '018': Primrose Hill (2002)
This site is in mown grass near the summit of Primrose Hill. There is some diversity in the grass sward but a combination of trampling and regular mowing limits the growth of the grass and has resulted in a rather standardized sward.

171 'GP003': Greenwich Park (2002–2003)
A diverse sward in a newly opened part of the deer enclosure. Well-trampled and grazed.

6 'Oak': Alexandra Park (1985–1986)
This site in a public park is on unimproved grass including some *Festuca* spp., growing fairly sparsely as the area is shaded by two nearby oak tress. Mown annually and quite heavily trampled.

170 'GP002': Greenwich Park (2002–2003)
A less diverse sward than 'GP003' in an older part of the deer enclosure. Heavily trampled and grazed, and due to the deposition of dung over many years probably has an elevated nutrient level.

144 'RP013': Regent's Park (2002)
This site is in short, mown grass outside Leafyard Wood at Regent's Park, in an area not generally accessible to the public. The grass was planted some years ago and is dotted with hazel bushes.

17 '02': Kensington Gardens (1994–1995)
This site is in a small patch of native grasses partly grazed by geese inside the enclosure around The Serpentine, at the Kensington Gardens side of Hyde Park.

9 'Birch': Hyde Park (1994–1995)
This site and 'Descha' (below) are both in partly improved grassland in the central part of Hyde Park, regularly mown and trampled. The area for sampling was chosen as having some relics of a more natural flora and a diversity of grass species as compared with most other parts of the park.

10 'Descha': Hyde Park (1994–1995)
This site was chosen as a small group of *D. cespitosa* plants was found in the meadow area that is now allowed to grow taller for some months in the summer before being mown.

11 'Westo': Crouch End (1986–1987)
Centre of a typical London garden lawn; heavily trampled and regularly mown.

Long grass sites (main sward over 10 cm)

185 'BAA05': Camp 4 Conservation Site (2003–2004)
This site is in long grass among tussocks on poor gravelly soil, which have been undisturbed for several years. It is very little trampled, but may be lightly grazed by deer.

195 '007' Old Accommodation Lane: Harmondsworth Moor (2002–2003)
This site is a small relic grassy area dominated by *Festuca* spp. in a gap between hedge sections along the side of an old country lane. It is unimproved, unmown and not trampled.

138 'hl037': Moor Park Fields (2002)
This site is in an old meadow full of grass tussocks and anthills with sparse hawthorns and some oak seedlings. It is grazed by rabbits.

18 'Heath': Alexandra Park (1985–1986)
This site is in a dense diverse grassy sward in the north-east corner of Alexandra Park above the road. The area was relatively undisturbed and unmown during and before the sampling period.

198 '014' Area 5/6: Harmondsworth Moor (2003–2004)
A large reseeded meadow on capped landfill, established about ten years ago with a 'natural' seed mix adjacent to relic meadow areas. Occasionally mown but only lightly trampled.

197 '016' Area 4 meadow: Harmondsworth Moor (2003–2004)
A similar area to '014' (above), in the upper part of the large meadow.

176 'BAA04': Roman site (adjacent to Heathrow Constructed Wetland) (2003–2004)
This site is in undisturbed long grass, on clay with flints, which has not been mown or improved but may be lightly grazed by deer, hares, etc.

141 'Goosepen': Regent's Park (2002)
This site is in a diverse but probably sown sward of native grasses with many flowering plants within the goose enclosure. It is untrampled and unmown, and hardly grazed by the geese at all as they stay in the mown part of the meadow.

26 'Birch': Putney Heath (1990–1991)
This site is in unimproved grass in the central part of Putney Heath well away from main paths, but occasionally mown.

126 'hl002': Haydon Hall Meadows, Hillingdon (2002)
This site is near the middle of an unimproved meadow of native grasses, unmown but occasionally quite heavily grazed by horses, although not at all grazed during the 12-month trapping period.

132 'hl026': Austin's Fields, Ickenham (2002)
This site is at the edge of a large unimproved meadow, among some tussocks of *D.cespitosa*. The area is damp and occasionally waterlogged in winter. The meadow, though not the trap-site is mown annually, but there appears to be no grazing.

19 'Glade': Coldfall Wood (1991)
This site is in the small natural grassy area on the west side of Coldfall Wood. It is fairly heavily trampled but unmown.

129 'hl012': Carp Ponds and Broads Dock, West Drayton (2002)
This site is in a small grassy area on the gravel ridges between the ponds. It is unimproved grass, unmown, little trampled but not apparently grazed.

12 'Tussoc': Alexandra Park (1985–1986)
This site is in damp tussocky (*D.cespitosa*) grassland inside the Conservation Area at Alexandra Park.

142 'RP005': Regent's Park (2002)
This site is in dense long grass inside the Bush Cricket Pen. It is not mown and is undisturbed (there is no public access to the enclosure).

25 'Mut': Mutton Brook, Finchley (1990–1991)
This site is in unmown, untrampled grass above the Mutton Brook near Henley's Corner in Finchley. A mixed sward of native grasses, it has apparently been undisturbed for some years.

169 'GP004': Observatory Slope, Greenwich Park (2003–2004)
This site is in thick semi-natural sward on a steep NW-facing slope, partly shaded, undisturbed and ungrazed (inside an area closed to the public).

143 'RP006': Regent's Park (2002)
This site is just outside the Bush Cricket Pen near the centre of Regent's Park in rough grass that is occasionally mown. It is however 'improved' grassland with no sign of finer native grasses such as *Festuca* spp.

Hampstead Heath sites (in sector order)

Sector 1 (Parliament Hill Fields and southern meadows)

89 '111': Kite Hill (SE slope) (1996–1997)
This site is in a small patch of mainly *Festuca* spp. within a mixed grass sward, partly invaded by brambles from a nearby patch until these were removed in the winter of 2001–2002. The area was regularly mown at least twice a year until 1995, and subsequently has been mown irregularly but never more than once a year. Not heavily trampled.

99 '112': Tumulus Field (1997)
This site is on level ground in an area of *Agrostis* spp. This part of the meadow has not been mown more than once a year for at least ten years and is now not mown and the sward is gradually thickening. Not heavily trampled. First 12-month sample was in 1997.

Sector 2 (Eastern meadows)

14 '233': Bird Sanctuary (1991–1992)
This site has changed somewhat in the past few years. It is within the Bird Sanctuary enclosure and so is not accessible to the public. In 1991–1992 it was a small meadow with some tussocks of *D.cespitosa* developing within the mainly wooded area of the sanctuary. It was machine mown in 1992 but following the writer's suggestion this was discontinued and the meadow rapidly developed as a rough area of tussocks with successive invasions of rosebay willowherb, and several other tall herbs. There is clearly a rapid succession taking place, and without grazing animals or the active removal of tree seedlings, will revert to secondary woodland.

Sector 3: (North-eastern meadows adjacent to Kenwood)

88 '311': Lower Cohen's Field (1991–1992)
This is a damp site, occasionally waterlogged in a meadow that was ploughed up and sown with seed to create a wildflower meadow around 1985. Since then it has largely reverted to being a damp meadow with little sign of the wild flowers. The sward is mixed with various grasses (apparently not including *Festuca* spp.) with several areas of rushes (*Juncus* spp.) and much sedge (*Carex* spp.). There is relatively little trampling. Part of the meadow is now mown annually but the trap site is outside this area and has not been mown since trapping started.

Sector 5 (Vale of Health and surrounding areas down to the Lime Walk)

4 '511': *Atypus* slope (1994)
This site is on steeply sloping SW-facing ground above the Vale of Health. The soil is gravelly (Claygate Beds) and it is within the area occupied by the colony of *Atypus affinis*.

The sward is more diverse than on most parts of the heath, and there is abundant *Rumex acetosella*. It is grazed by rabbits and is fairly heavily trampled but unmown due to the slope.

Sector 6 (East Heath and Preacher's Hill)

96 '611': Pryors Field (1991–1992)
This site is in dry grassland on the sandy Pryors Field (East Heath). The sward is mainly fine grasses, such as *Agrostis* spp. and *Festuca* spp. as well as rushes (*Juncus* spp.). There has been no general mowing of this area since at least 1994, although it is somewhat trampled by the public.

Using pitfall data to characterize sites

From the 12-month sample data a number of totals have been calculated so that different sites can be compared or changes at individual sites can be traced (Table 2). There are scores based on species occurrence and others on the total number of individuals of particular groups of species. In the previous report (Milner 2000) the following numbers were used to compare sites: total numbers (T), number of species or species richness (S), and the Species Conservation Value (SCV) now renamed the Conservation Index (CI), defined as the annual total of five pioneers (W) divided by the total of lycosids (G) as typical grassland species. Two new scores S1 and S2 have now been added using the BMS weighting described in Table 2, and a Grassland Conservation Value is also proposed.

Total numbers (T)

The total numbers of each species vary from year to year (and obviously drop to zero on occasion) but the significance of this figure is not easy to interpret. It may vary according to the efficiency of the traps at different times of year — for instance some traps occasionally become waterlogged and may not function for short periods. As a result catches are inevitably depressed during very wet months.

The relative numbers of different species or groups of species may be significant but has yet to be pursued.

Species richness (S)

This is the term used for the total number of species found to occur in a 12-month sample and varies considerably from relatively impoverished sites such as lawns to those sites with a good management history resulting in considerable structural diversity and low levels of disturbance. In the samples given in Table 2 the lowest scores (below 20) are from the Crouch End lawn and for three sites in Hyde Park. While scores over 40 were achieved by 5 sites; at Springwell Chalkpit (2), on Barnes Common (1) and inside the Bird Sanctuary at Hampstead Heath (1), all the other sites scored between 20 and 40. This simple score is not very satisfactory as it fails to separate 'better' sites from others, i.e. those with species of high conservation value.

The highest score (45) was noted for the Bird Sanctuary site at Hampstead Heath, but in spite of this high score it included no uncommon species and few grassland specialists. The five highest scoring sites are of very varying conservation value, while other 'better' sites scored less than 40; for example Pryors Field at Hampstead Heath which only scored between 27 and 30 in the 6 samples, but consistently included one *Red Data Book* species (*Tapinocyboides pygmaeus*), one Nationally Notable species (*Lepthyphantes insignis*), and also *Talavera aequipes*.

In a previous report (Milner 2000) a primitive weighting system for species was proposed to determine relative 'interestingness' of sites. This idea has now been developed as the following score S1.

Weighted Species Score (S1)

A weighted score (BMS; see Table 2) is used for each species and so a total is produced taking account of the relative conservation value of each species.

In the 'better' sites this score is higher than the simple S score, while in the 'poorer' sites the S1 score is lower than the simple S score. For example sites at Barnes Common, Brompton Cemetery ('Yew' site), Pryors Field Hampstead, Springwell Avenue Chalkpit and Moor Park Fields all have S1 scores at least 50 per cent above their S scores, and these display botanically and structurally diverse swards, and are the richest, least damaged sites. Poorer, altered and highly disturbed sites such as Westo (a lawn in Crouch End), Regent's Park and Hyde Park all score S1 very much lower than S, in some cases 0 or even a minus score.

Weighted Species Score (S2)

This is a simplified version of S1 which ignores all species whose BMS scores are from 0 to 2, leaving a score derived only from grassland specialists (scoring above 2) and pioneers (scoring below 0), and similarly this separates the better sites from the poor ones very well.

Grassland Conservation Value (GCV)

This is produced by the formula $S1/S \times 100$ (as The Saproxylic Quality Index produced by Fowles). The formula effectively produces a value per species found; some sites have S scores of only 30 or 31 (see Table 2A) but are among the highest for GCV, whereas in Table 2A the three sites with over 40 species only have GCV scores of 157–168.

Conservation Index (CI)

Unlike the above scores which are based on occurrence rather than numbers, the Conservation Index was originally proposed by the writer in relation to findings from sites on Hampstead Heath (Milner 1993), and is calculated from the total numbers of certain individual species. This is an arbitrary index, and rather a blunt instrument aggregating as it does some species whose response to disturbance may not be exactly the same. It is based on the observation that among the common grassland spiders the main lycosid species are the quickest to respond to reductions in disturbance either caused by trampling or by mowing, as are the five pioneer species. Other species such as *Bathyphantes gracilis* and *Lepthyphantes tenuis* have pioneer characteristics but as these seem to be almost ubiquitous and are often present in similar numbers whatever the state of the grassland, they have been excluded.

The CI score is calculated as W/G where W is the total of 5 pioneer species and G is the total of the characteristic grassland lycosids (Table 2) excluding *Pirata* spp. This may be particularly useful for monitoring improvement among middle to average sites, which may have few if any high BMS scoring species, but which nevertheless could improve. For these sites the change could be detected by the appearance of increasing numbers of lycosids in relation to pioneers, even where the S1 score was still very low.

Comparison of sites based on the proposed criteria

Sites across London are compared in Table 2A (sites with short grass, <10 cm), 2B (sites with long grass, >10 cm, mostly unmown) and 2C (sites on Hampstead Heath, all mown with greater or lesser frequency), with sites listed in order of GCV.

Sites with short grass (height of main sward <10 cm) (Table 2A)

The sites vary considerably in diversity and in the degree of disturbance due to mowing and trampling. Among the shorter grass sites those in what may be

termed intensively managed public parks such as Hyde Park, most sites Regent's Park etc., have low S scores and very low S1 scores. They also score high on CI usually because of high W scores but also in some cases because of low G scores as well. At one site in Hyde Park over 1000 W group spiders were taken at a single site in one year, while 890 were trapped on a garden lawn in Crouch End. These sites have generally S scores below 30 and S1 scores which are even lower and can be below zero. In other words these sites are characterized by large numbers of a few species, dominated by *Oedothorax* spp. and to a lesser extent by *Erigone* spp. The site at Hyde Park called 'descha' has a few individuals of *Deschampsia cespitosa*, but it has been so frequently and closely mown for many years that no one had even noticed that this grass, which normally forms substantial tussocks, was present until the author's spider survey of the park.

A second group of short grass sites which have been much less intensively managed, display a greater floristic diversity and, perhaps more importantly for the invertebrate fauna, greater structural and micro-topographical diversity (with numerous anthills and grass tussocks). These sites, at Barnes Common, and Springwell Avenue Chalkpit, are either grazed by rabbits or cut using a strimmer or even by hand (Brompton Cemetery). They are characterized by higher S scores and by S1 scores that are considerably higher (often 50 per cent higher) than the S scores. G scores are variable but usually above 200 (lower than in undisturbed sites with longer grass) while W scores are very low, as a result of which their CI scores are around 0.02 or even lower.

Sites with long grass (height of main sward >10 cm) (Table 2B)

These sites are less disturbed, i.e. mown infrequently or grazed less, than the short grass sites discussed above. Total numbers are much lower; the mean for these 15 sites is 462 compared with 701 for the 12 short grass sites. However species richness is only marginally higher (mean of 31.3 compared with 30.4) while S is much higher (mean 34 compared with 28.8). In most of these sites S1 is higher than S but not by very much; only in one case (Moor Park Field) is S1 more than 50 per cent higher, and this is a site with a high density of anthills and tussocks and very little disturbance.

G scores for several of these sites is much higher than any of the short grass sites, and at Haydon Hall Meadows and two sites on Hampstead Heath (Table 2C) G numbers of over 380 have been recorded. W scores are generally much lower than for most of the short grass sites, and in several sites there were scores of zero for these species. As a result the CI is generally very low for these sites. When the Hampstead Heath sites are included several high W scores are noted although G scores are generally high as well.

It is very uncommon for sites to have similar W and G scores; either the G score is large and the W score low or the other way round. However it is possible for these scores to be reversed under changes in management as can be seen from the records of successive years at specific sites (see section on Hampstead Heath below).

Grassland Conservation Value

When the sites are compared using the Grassland Conservation Value it would seem that apart from the high S1 score (and S2 score) the sites with a high GCV are varied as to totals and species richness; the sites with the highest S scores do not necessarily have high GCVs. However all the sites with a high GCV (over say 130) have large numbers of lycosids, while among short grass sites at least, most sites with large numbers of pioneers have low GCV scores. In other words a high species richness does not guarantee quality of a site.

Sites with long grass tend to have lower numbers of pioneers (and often much higher numbers of lycosids), and they are more variable in most dimensions. As with short grass sites the sites with highest S scores are not necessarily the best.

At Hampstead Heath, GCV produces a very different order of importance from that based on the raw S scores. Pryors Field with a mean score of 28.1 species (over the seven 12-month samples), has a mean GCV of over 200, while the site in the Bird Sanctuary with a mean number of species of 37.3 consistently scores below 100 for its GCV. The value of this site has certainly been depressed by inappropriate management (machine mowing which has removed or damaged large tussocks etc.) in recent years but in the last complete year the site still produced over 40 species but had a GCV of only 71.

One disadvantage of GCV is that a score can be greatly altered by the presence or absence of a single high-value species in any one particular year.

Comparing scores over successive years (Hampstead Heath)

At several sites on Hampstead Heath standard samples have been obtained for a number of separate, though not necessarily successive, years (Table 3A–3K). Taking these sites in order of reference number the criteria suggested above have been used as an indication of changes at these sites. A suggested interpretation of the data from each site is given below that part of the table.

The proposed criteria certainly separate poor, reasonable and better sites, but they may need refining and augmenting with other observations. Perhaps a checklist of characteristics of grassland could eventually be developed to include botanical features, structural features (such as the occurrence of grass tussocks and anthills), soil pH, drainage and aspect, and these could all be associated with particular species of spiders or groups of species.

Discussion

The response of the spider fauna to natural conditions and the effects of management are complex, and several different features need to be assessed from pitfall data. Pitfall data has both advantages and disadvantages: while it is easily replicable and has a low impact on the habitat it clearly favours some species over others, is skewed towards males, is affected by excess rainfall and may be more effective in short grass than long. There may be other effects which skew the catches, but from a careful examination of data obtained from a substantial number of sites in the London area so few anomalous results have appeared that the writer suggests the methods can be used with some confidence. Within the limitations, and bearing mind that other methods have other often more serious disadvantages, it is proposed that standardized 12-month pitfall data and the various scores proposed may, if taken together, offer a useful way of comparing sites and noting changes from year to year. The observed differences can reasonably be attributed to variations in management. While the CI score is an arbitrary figure it may still be useful to track large-scale changes in the spiders fauna, the 3 S scores give a more detailed and accurate picture of the state of the grassland habitat.

The new Grassland Conservation Value, proposed here, appears to work well as a single index for comparing sites and tracking changes at individual sites, and is useful for land managers who are concerned about the improvement in or maintenance of grassland quality as determined by the spider fauna.

This is obviously only part of the story, but pitfall trapping for ground-active spiders is a relatively straightforward method of monitoring grassland. Site visits need only be on a monthly basis (and possibly less frequently) and the fieldwork hardly onerous. Sorting and identification is obviously time-consuming but overall the method would appear to be highly cost-effective.

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TABLE 1. Average numbers of selected species in 12-month pitfall samples, at grassland sites (of varying grass heights) grouped by disturbance level (from Milner 2000, Table 6b).

Species	Disturbance level		
	Low (8 sites)	**Medium** (20 sites)	**High** (7 sites)
Pardosa pullata	87	47	16
Alopecosa pulverulenta	39	45	9
Pardosa palustris	30	65	35
Oedothorax fuscus	9	88	298
Erigone dentipalpis	6	17	277
Milleriana inerrans	<1	2	50

TABLE 2. Proposed Biodiversity Matrix Scores for spider species trapped in grassland in the London area.

Sites = No. of sites recorded in London area: London, Middlesex, including Richmond Park (Surrey) and north-east London boroughs (Essex).

A = Score for National Conservation Status:
RDB = 16, Notable A = 8, Notable B and Nationally Scarce (Nat. Sc.) = 4,
Local = 2, Common = 0

B = Score for recorded occurrence in the London area (up to 2003):
1–5 sites = 3; 6–15 sites = 2; 16–30 sites = 1; >30 sites = 0

C = Habitat preference score (based largely on habitat profiles given by Harvey et al. (2002))
2 = Grassland specialists
1 = Grassland species found in some other habitats
0 = Species found in grassland but not thought to be primarily grassland species
–1 or –2 = Pioneers, ruderals etc.
–3 = Disturbed-habitat specialists

BMS = Biodiversity Matrix Score: total of A, B and C for each species

2A: Grassland specialists and species characteristic of grassland
(Scoring 2 for column C)

Species	National Status	A	No. of Sites	B	C	BMS
Tapinocyboides pygmaeus	RDB	16	2	3	2	21
Enoplognatha oelandica	RDB	16	1	3	2	21
Zodarion italicum	Nat. Sc.	4	3	3	2	9
Lepthyphantes insignis	Nb	4	5	3	2	9
Centromerus incilium	Nb	4	6	2	2	8
Atypus affinis	Loc	2	2	3	2	7
Steatoda phalerata	Loc	2	3	3	2	7
Walckenaeria vigilax	Loc	2	2	3	2	7
Metopobactrus prominulus	Loc	2	1	3	2	7
Agroeca inopina	Loc	2	4	3	2	7
Thanatus striatus	Loc	2	1	3	2	7
Typhochrestus digitatus	Loc	2	1	3	2	7
Xysticus erraticus	Loc	2	7	2	2	6
Ozyptila simplex	Loc	2	8	2	2	6
Talavera aequipes	Loc	2	12	2	2	6
Cicurina cicur	Loc	2	13	2	2	6
Drassodes cupreus	Loc	2	7	2	2	6
Haplodrassus signifer	Loc	2	6	2	2	6
Clubiona neglecta	Loc	2	10	2	2	6
Ceratinopsis stativa	Loc	2	7	2	2	6
Tapinocyba praecox	Loc	2	16	1	2	6
Alopecosa cuneata	Loc	2	10	2	2	6
Pardosa monticola	Comm	0	2	3	2	5
Agroeca proxima	Comm	0	2	3	2	5
Clubiona diversa	Loc	2	18	1	2	5
Cnephalocotes obscurus	Loc	2	25	1	2	5
Agyneta decora	Loc	2	19	1	2	5
Agelena labyrinthica	Comm	0	13	2	2	4
Meioneta beata	Loc	2	35	0	2	4
Centromerita concinna	Comm	0	22	1	2	3
Microlinyphia pusilla	Comm	0	19	1	2	3
Zora spinimana	Comm	0	30	1	2	3
Alopecosa pulverulenta	Comm	0	70	0	2	2
Pardosa pullata	Comm	0	90	0	2	2
Pardosa prativaga	Comm	0	58	0	2	2
Euophrys frontalis	Comm	0	48	0	2	2
Gongylidiellum vivum	Comm	0	55	0	2	2
Diplocephalus cristatus	Comm	0	31	0	2	2
Trochosa terricola	Comm	0	54	0	2	2
Trochosa ruricola	Comm	0	37	0	2	2

2B: Grassland species associated with ants
(Scoring 1 or 2 for column C)

Species	National Status	A	No. of Sites	B	C	BMS
Zelotes latreillei	Loc	2	28	1	2	5
Zelotes apricorum	Loc	2	6	2	1	5
Drassyllus pusillus	Loc	2	13	2	2	6
Phrurolithus festivus	Comm	0	39	0	1	1
Micaria pulicaria	Comm	0	32	0	1	1

2C: Grassland species found in some other habitats, and others that are not primarily grassland species (Scoring 1 or 0 for column C)

Species	National Status	A	No. of Sites	B	C	BMS
Bianor aurocinctus	Na	8	4	3	1	12
Mioxena blanda	Nb	4	1	3	1	8
Pardosa agrestis	Nb	4	7	2	1	7
Clubiona subtilis	Loc	2	4	3	1	6
Agroeca brunnea	Loc	2	3	3	1	6
Floronia bucculenta	Loc	2	5	3	1	6
Pardosa hortensis	Loc	2	1	3	1	6
Pirata latitans	Loc	2	11	2	1	5
Pirata uliginosus	Loc	2	18	2	1	5
Argenna subnigra	Loc	2	6	2	1	5
Ozyptila sanctuaria	Loc	2	11	2	1	5
Robertus arundineti	Loc	2	7	2	1	5
Arctosa leopardus	Loc	2	2	3	0	5
Panamomops sulcifrons	Loc	2	30	1	1	4
Agyneta conigera	Comm	0	3	3	1	4
Xysticus kochi	Loc	2	29	1	1	4
Walckenaeria atrotibialis	Loc	2	25	1	1	4
Pelecopsis parallela	Loc	2	21	1	1	4
Pocadicnemis pumila	Comm	0	5	3	1	4
Dicymbium nigrum	Loc	2	22	1	1	4
Clubiona trivialis	Comm	0	1	3	1	4
Araeoncus humilis	Comm	0	6	2	1	3
Leptorhoptrum robustum	Comm	0	15	2	1	3
Pardosa nigriceps	Comm	0	11	2	1	3
Ceratinella brevipes	Comm	0	6	2	1	3
Cheiracanthium erraticum	Comm	0	12	2	1	3
Hahnia nava	Loc	2	38	0	1	3
Enoplognatha thoracica	Loc	2	34	0	1	3
Dicymbium brevisetosum	Loc	2	50	0	1	3
Heliophanus flavipes	Comm	0	24	1	1	2
Walckenaeria cucullata	Comm	0	19	1	1	2
Walckenaeria unicornis	Comm	0	21	1	1	2
Tapinopa longidens	Comm	0	18	1	1	2
Clubiona lutescens	Comm	0	28	1	1	2
Troxochrus scabriculus	Comm	0	12	2	0	2
Pardosa palustris	Comm	0	43	0	1	1
Pardosa amentata	Comm	0	46	0	1	1
Clubiona reclusa	Comm	0	54	0	1	1

Species	National Status	A	No. of Sites	B	C	BMS
Xysticus cristatus	Comm	0	92	0	1	1
Robertus lividus	Comm	0	33	0	1	1
Walckenaeria acuminata	Comm	0	62	0	1	1
Walckenaeria antica	Comm	0	58	0	1	1
Maso sundevalli	Comm	0	53	0	1	1
Pocadicnemis juncea	Comm	0	58	0	1	1
Tiso vagans	Comm	0	49	0	1	1
Micrargus herbigradus	Comm	0	68	0	1	1
Centromerus sylvaticus	Comm	0	36	0	1	1
Centromerus dilutus	Comm	0	32	0	1	1
Centromerita bicolor	Comm	0	58	0	1	1
Nereine clathrata	Comm	0	77	0	1	1
Pachygnatha degeeri	Comm	0	99	0	1	1
Pachygnatha clercki	Comm	0	60	0	1	1
Bathyphantes parvulus	Comm	0	45	0	1	1
Stemonyphantes lineatus	Comm	0	55	0	1	1
Lepthyphantes mengei	Comm	0	33	0	1	1
Lepthyphantes ericaeus	Comm	0	67	0	1	1
Bathyphantes gracilis	Comm	0	106	0	0	0

2D: Pioneers, ruderal species and others not particularly associated with grassland

Species	National Status	A	No. of sites	B	C	BMS
Enoplognatha latimana	Loc	2	11	2	–1	3
Ostearius melanopygius	Loc	2	9	2	–2	2
Tegenaria agrestis	Loc	2	18	1	–2	1
Porrhomma microphthalmum	Loc	2	12	1	–2	1
Micargus subaequalis	Loc	2	39	0	–1	1
Oedothorax apicatus	Loc	2	7	2	–3	1
Meioneta rurestris	Comm	0	56	0	0	0
Milleriana inerrans	Loc	2	39	0	–2	0
Erigonella hiemalis	Comm	0	29	1	–1	0
Drassodes lapidosus	Comm	0	39	0	–1	–1
Savignia frontata	Comm	0	28	0	–1	–1
Lepthyphantes tenuis	Comm	0	126	0	–1	–1
Enoplognatha ovata	Comm	0	67	0	–1	–1
Dismodicus bifrons	Comm	0	29	1	–2	–1
Neottiura bimaculatum	Comm	0	55	0	–2	–2
Diplostyla concolor	Comm	0	96	0	–2	–2
Oedothorax fuscus	Comm	0	69	0	–3	–3
Oedothorax retusus	Comm	0	54	0	–3	–3
Erigone dentipalpis	Comm	0	85	0	–3	–3
Erigone atra	Comm	0	98	0	–3	–3

TABLE 3. Analysis of 12-month pitfall catches for grassland sites.

S = No of species
S1 = weighted species total (total of BMS numbers)
S2 = as for S1 but excluding species with BMS numbers of 1 and 2 (these are the commonest species)
Where S1 at least 2× S it is marked *
GCV = S1/S × 100
G = total of (common) grassland species (all lycosids excluding *Pirata* spp.)
W = total of 5 opportunist (pioneer) spp.: *Oedothorax fuscus, O. retusus, Milleriana inerrans, Erigone dentipalpis* and *E. atra*
CI = Conservation Index (W/G): above 1 damaged/unhealthy/unstable habitat, below 1 healthy/stable. A zero score indicates healthy well-established grassland with no pioneers
Est. Dist. = Estimated level of disturbance (by mowing and/or trampling):
low = 1, medium = 2, high= 3. (M) = mown, (G) = grazed

3A: Short grass sites: either grazed (usually by rabbits)(G) or mown (M) (12-month samples)

Ref.	Trap site	Est. Dist.	Year	Total	S	S1	S2	GCV	G	W	CI
184	'BAA14' Camp 4 meadow	2(M)	2003–04	940	35	86*	66	**246**	481	1	<0.01
168	'GP006' Blackheath	2	2003–04	1,206	30	67*	53	**223**	302	15	0.05
2	'Yew' Brompton Cemetery	2 (M)	1995	464	31	66*	45	**213**	243	1	<0.01
196	'Area 4' Harmondsworth Moor	2	2003–04	407	31	62*	41	**200**	282	1	<0.01
117	'043' Springwell chalkpit	1(G)	2002	708	44	74	49	**168**	246	6	0.02
178	'BAA06' Two Bridges Farm	2–3 (M)	2003–04	1,226	37	61	42	**165**	671	83	0.12
13	'Open' Barnes Common	1	1990	475	42	66	44	**157**	201	4	0.02
140	'023' Springwell Chalkpit	1(G)	2002	605	46	72	49	**157**	244	5	0.02
1	'Oak' Brompton Cemetery	2 (M)	1995	458	35	54	32	**154**	222	3	0.01
149	'018' Primrose Hill	2(M)	2002	428	27	39	24	**144**	3	165	55
171	'GP003' Greenwich Park	3(deer)	2002–03	953	33	34	14	**103**	30	553	18.4
6	'Oak' Alexandra Park	3(M, T)	1985–86	1,324	32	27	10	**84**	8	556	69.5
170	'GP002' Greenwich Park	3(deer)	2002–03	1,958	24	20	7	**83**	41	1,396	34
144	'RP013' Regent's Park	2(M)	2002	535	31	14	-2	**45**	45	127	2.8
17	'02' Kensington Gardens	1–2	1994–95	238	27	7	-6	**26**	24	23	0.96
9	'Birch' Hyde Park	3(M,T)	1994–95	776	16	-1	-7	-	33	472	14.3
10	'Desch' Hyde Park	3(M,T)	1994–95	1,418	17	-1	-8	-	119	1,029	8.65
11	'lawn' Crouch End	3(M,T)	1986–87	941	18	-3	-12	-	1	890	890

3B: Long-grass sites (12-month samples)

Ref.	Trap site	Est. Dist.	Year	Total	S	S1	S2	GCV	G	W	CI
185	'BAA15' Camp 4 Tussocks	1	2003–04	353	39	86*	61	**221**	202	0	0
195	Old Acc Lane: Harmondsworth Moor	1	2003–04	330	41	87*	60	**212**	85	6	0.07–
138	'hl037' Moor Park Fields	1	2002–03	554	35	67	42	**191**	195	0	0
18	'Heath' Alexandra Park	2(M)	1985–86	1,143	34	60	35	**176**	394	9	0.02
176	'BAA04' Heathrow Constr. Wetland	1	2003–04	1,379	42	55	36	**131**	743	91	0.12
141	'Goosepen' Regent's Park	1–2	2002	701	23	30	15	**130**	196	1	<0.01
26	'Birch' Putney Heath	2 (M)	1990–91	169	26	32	4	**123**	28	0	0
126	'002' Haydon H. Meadows	2 (M)	2002	793	26	29	10	**112**	388	8	0.02
132	'026' Austin's Pastures	2 (M)	2002	574	37	41	20	**111**	274	62	0.22
19	'Glade' Coldfall Wood	2–3 (T)	1991	570	38	41	19	**108**	295	54	0.18
129	'012' Carp Ponds	1–2	2002	210	33	30	6	**91**	73	0	0
12	'Tussoc' Alexandra Park	2(M)	1985–86	237	31	28	4	**90**	92	17	0.18
142	'RP005' Regent's Park	1–2	2002	287	20	16	2	**80**	42	1	0.02
25	Mutton Brook	1–2	1990–91	347	30	23	3	**77**	119	0	0
169	'GP004' Greenwich Park	1	2002–03	537	22	14	4	**64**	63	1	0.02
143	'RP006' Regent's Park	1	2002	497	23	11	-3	**48**	106	150	1.4

3C: Hampstead Heath sites (summary table)

Data for six sites which have been sampled for several years are summarised. Each column gives average figures for the years sampled. The number of years is given in column 3. It is noticeable that once weighted scores (**heavy type**) for species are used, the relative importance of the sites changes considerably.
Sectors are as defined by the Hampstead Heath Survey

Sector*	Trap site	No. of years sampled	Total	S	S1	S2	GCV
6	611 Pryors Field	7	816	28.1	**58.7**	**39**	**210**
5	511 *Atypus* slope	6	602	29.3	**47.7**	**26.2**	**165**
1	112 Tumulus F.	6	1,853	26.5	**35.5**	**24**	**147**
3	311 Lower Cohen's Field	7	744	25.7	**26.3**	**6**	**102**
1	111 Kite Hill	7	859	31.9	**30.4**	**10.1**	**95.6**
2	233 Bird Sanctuary	4	432	37.3	**30.8**	**5**	**85.3**

TABLE 4. Hampstead Heath sites (in order of sector on the Heath).

= mown during the trapping period

4A : Kite Hill (111)
A fairly diverse grassland site sloping SW, with some patches of *Festuca* spp., but disturbed and mown a great deal until about 1995, and mown less often since. No anthills or well-developed tussocks.

Ref.	Year	Total	S	S1	S2	GCV	G	W	CI
7	1991–92	995	29	12	0	**41**	15	455	30.3
27	1995–96	1,562	32	26	7	**81**	246	134	0.54
89	1996–97	818	29	32	12	**110**	231	77	0.3
100	1997–98	842	34	38	15	**112**	188	51	0.27
108	1998–99	884	33	30	11	**91**	190	51	0.27
112	2002	459	33	33	6	**100**	148	3	0.02
154	2003#	453	33	42	20	**127**	154	5	

Interpretation:

1. Total (T) varies year by year not necessarily due to management, but probably more in relation to the rainfall and temperature.
2. S remains about the same but may be slowly improving: last 3 years better than any of the first 3 years.
3. S1 is a more sensitive indicator of the value of the site, which shows more fluctuation but a bigger total improvement since 1991–92, however S1 is still only a little above S. S2 is disappointing, showing that the value of the site is still not very good: some grassland sites on Hampstead Heath regularly score over 40 on S2 even where their S is no higher than at this site.
4. GCV gradually improving as disturbance is less.
5. G score first increased dramatically from 1991–92 (when the site was regularly mown) and has now stabilised around 150–200 level in a 12-month sample. At the same time the W score has dropped even more spectacularly (and continuously) since 1991. This shows that while unwanted elements (pioneers) can be reduced fairly quickly, increasing numbers of grassland specialists to return (or appear for the first time) may take longer. CI score has therefore improved spectacularly since 1991.

Conclusion. This is an unexceptional site which has improved considerably with a more relaxed mowing regime. However it has few grassland specialists, and may take some years to improve much further. It may never reach the same quality as other sites such as Pryors Field (611) or the *Atypus* slopes (511). Unsurprisingly, no species associated with ants are present.

4B: Tumulus Field (112)

This site is in the middle of a large flat area of fine grasses mostly *Agrostis* spp., has been less disturbed and mown than the previous site. The site has not been mown now for at least five years. No anthills or tussocks, but some anthills are developing within about 50 metres.

Ref.	Year	Total	S	S1	S2	GCV	G	W	CI
20	1995	1,549	28	24	7	**86**	181	669	3.7
98	1996	2,590	26	13	-2	**50**	459	829	1.81
99	1997	2,081	25	46	35	**184**	190	1,413	7.4
111	1998–99	1,735	22	37	26	**168**	250	524	2.1
122	2002	1,515	29	59*	41	**203**	474	220	2.15
155	2003	1,647	29	56	37	**193**	294	585	

Interpretation:

1. Total numbers (see above); as for the previous site and Lower Cohen's Field (311) 1996 produced by far the highest numbers, although this is not the year with highest numbers elsewhere on the Heath.
2. S is variable, lower than at Kite Hill but the last year (2002) was the highest so far. No species associated with ants are present.
3. Even though S is low, S1 is higher as is S2, suggesting that while there are fewer species a higher proportion are the desired grassland specialists; i.e. this should be considered a 'better' site.
4. The S1 score for 2002 is much the highest so far, and the S2 score is also the highest recorded.
5. GCV has improved considerably to over 200 for 2002.
6. G and W scores for this site are more variable and the W score while dropping was still the highest for any site on the Heath in 2002. G and W scores do not show clear trends, but as the effects of zero mowing over several years are seen, perhaps the W score will drop from the unhealthy high score at present.

Conclusion. Potentially a good site with a depressed current diversity in spite of the irregular occurrence of *Red Data Book* species *Tapinocyboides pygmaeus*. Perhaps the site will improve with numbers of this rare species increasing and W numbers dropping. In 2003 one immature *Zelotes latreillei* was trapped; perhaps this ant-associated species will now establish itself here.

4C: Bird Sanctuary meadow (233)

A tussocky grass area (*Deschampsia cespitosa)* invaded by some tall herbs, with some anthills, but damaged by occasional mowing which has prevented the full development of the tussocks.

Ref.	Year	Total	S	S1	S2	GCV	G	W	CI
14	1991–92	549	45	37	8	**82**	208	4	0.02
87	1996–97	616	35	24	-2	**69**	436	0	0
114	2002	189	27	32	12	**119**	97	0	0
161	2003#	375	42	30	2	**71**	245	3	0.01

Interpretation:

1. This site scored the highest S for any grassland sample in 1991–92, but when S1 and S2 are calculated both were much lower than other sites.
2. Since 1997-98 the site has recovered from an unfortunate episodes when the mowing machine was mistakenly sent into this area in past years: probably 1994 and again in 1996 or 1997. In 2002 while S is much lower than in 1991-92, the S1 score has been above the S score.
3. Three species associated with ants are present: *Zelotes latreillei, Phrurolithus festivus* and *Micaria pulicaria*.
4. GCV is disappointingly low, showing that although there are many species here few are grassland specialists and at present it should be regarded as a damaged site probably also affected by being adjacent to woodland.

5. Encouragingly W has remained low (partly due to the grass growing long, it is assumed) and was 0 in 2002 but can be expected to rise since the mowing in 2003. G was a healthy 250, mostly *Pardosa amentata* and *P. pullata*.

Conclusion. A structurally diverse site (at least potentially) which is still recovering from episodes of mismanagement. The S scores can be expected to rise.

4D: Lower Cohen's meadow (311)

This site was used as an experiment in the early 1980s to establish a hay meadow with (sown) wild flowers. It is now a damp meadow with a good deal of *Carex* sp. and *Juncus* among the grass; the area is frequently waterlogged in the winter. No anthills or grass tussocks, but many tussocks of *Juncus* spp.

Ref.	Year	Total	S	S1	S2	GCV	G	W	CI
3	1991–92	951	24	8	–7	**33**	137	594	4.33
21	1995	625	28	24	3	**86**	214	44	0.21
88	1996	1,106	29	30	10	**103**	530	54	0.1
102	1997	743	27	35	12	**130**	488	6	0.01
105	1998	566	22	23	6	**105**	272	2	0.01
109	2002	779	25	30	9	**120**	324	0	0
162	2003	435	25	34	9	**136**	258	0	0

Interpretation:

1. The S score is lower than any of the previous sites, the mean being just 24.8 spp. S1 is higher and the 2 of the last 3 years it has been above the S score suggesting the site is improving, but it seems that improving S scores takes a long time.
2. No ant species present.
3. GCV is gradually improving but remains low.
4. G and W scores show the site has improved considerably since 1991 and CI has dropped to reached zero in the last year, where it was an unhealthy 4.3 in 1991–92.

Conclusion. The site is unremarkable but gradually improving.

4E: *Atypus* slopes above Vale of Health (511)

Dry gravelly slopes with some bare earth where there is a colony of *Atypus affinis*. Owing to the slope, this area has never been mown and has a diverse flora. Anthills are present but no tussocks.

Ref.	Year	Total	S	S1	S2	GCV	G	W	CI
4	1994–95	681	31	42	20	**135**	166	20	8.3
85	1995–96	372	33	50	30	**152**	76	21	0.28
93	1996–97	202	24	45	29	**188**	54	9	0.17
103	1997–98	350	31	44	20	**142**	213	22	0.1
116	2002	1,104	28	48	26	**171**	677	0	0
163	2003	903	29	57	32	**197**	248	0	0

Interpretation:

1. While the S score is reasonable (but usually below that for Kite Hill) the S1 and S2 scores are consistently much higher than S (unlike Kite Hill).
2. Three ant species present.
3. GCV has remained good, with the best score for 2003 at 197.
4. G has been increasing in the last 2 samples, while W, though fluctuating, is low, and was zero in 2002. As a result the CI has dropped consistently from 8.3 in 1994–95 to 0 in 2002.

Conclusion. This is a very good site and has not been damaged; because of that it is giving fairly consistent results for the most sensitive indicators, and a GCV of over 200 is expected soon.

4F: Pryors Field (611)

A dry sandy heath which was mown occasionally but has not had this treatment since about 1996–97. The grasses are mainly *Agrostis* spp. and *Festuca* spp. Occasional anthills but few tussocks. It is known for the fairly regular occurrence of the RDB species *Tapinocyboides pygmaeus*, and the Nationally Notable *Lepthyphantes insignis*.

Ref.	Year	Total	S	S1	S2	GCV	G	W	CI
23	1991–92	726	27	55*	36	**204**	96	71	0.74
24	1995	1,231	29	51	32	**176**	560	7	0.01
91	1996	637	24	62*	41	**258**	333	0	0
96	1997	614	28	64*	45	**229**	306	8	0.03
110	1998	523	28	54	34	**193**	173	12	0.07
115	2002	1,035	30	45	26	**150**	302	22	0.07
166	2003	948	31	80*	59	**258**	210	11	

Interpretation:

1. S score is unremarkable and lower than Kite Hill etc., but S1 and S2 are consistently high, with S1 regularly well above S although so far only 50 per cent above S in two years out of 6. The S1 of 80 recorded in 2003 is one of the highest recorded in the London area.
2. No species associated with ants; there are anthills developing within about 50 metres.
3. GCV has varied but mostly above 200 which is spectacular.
4. G now fairly consistently high, and much higher than in 1991–92 while W is now much lower. CI is good at 0.07 but could perhaps be even lower.

Conclusion. An excellent site, the best found on the Heath so far. The development of anthills could be expected to occur and this may eventually result in an increase for all the S scores.

Book review

The Rattlesnake. A voyage of discovery to the Coral Sea. Jordan Goodman. Faber and Faber. 2005. x + 357 pp., quarto, hardback, £18.99. ISBN 0 571 21073 2.

Charles Darwin's famous voyage on the British Admiralty survey ship HMS *Beagle* (1831–1836) has become so familiar to naturalists in recent years that, bizarrely, most of us now have a fair idea of what a Navy surveying expedition of the period was like. An absence of four to five years was typical. Hardship, the need for superb seamanship under sail, and slender chance of rescue, inevitably in poorly known or uncharted waters, were typical.

On 15 August 1834 the merchant ship *Charles Eaton* grounded on a coral reef in the Torres Straits, between Queensland (Australia) and Papua New Guinea. Eventually, almost all her passengers and crew were killed by local Aborigines. Only two made it back to civilization, more than two years later. The Torres Straits are shallow and congested with coral reefs and innumerable then uncharted islands. The growing volume of shipping through the region dictated a need for detailed charts. The *Charles Eaton* disaster shocked the British nation and spurred the Admiralty into dispatching the survey ship HMS *Rattlesnake* to chart the Straits, the north coast of Australia, the coastline of northern and mid Queensland, the offshore Great Barrier Reef and the waters inside it.

This she did, during the years 1846 to 1850. The book largely comprises a day-to-day account of the several expeditions made during these years by the *Rattlesnake* and associated smaller survey ships, and of their dangers, privations, frustrations, and successes. Today one is so used to expecting Admiralty charts and instructions to navigators to be of the highest standard, that one can easily forget the arduous and detailed work that has always gone into them. Such was the value put on Admiralty charts that they became available for public purchase so early as 1825, less than a decade after the first OS maps of the UK were published. Britain still ruled the waves, and they needed to be charted.

The *Rattlesnake* was larger than the *Beagle*, having a total complement of 179 officers and crew, all of Navy rank, compared with seventy-four of which Darwin and three native Patagonians returning home were civilians. The surgeon on the *Rattlesnake* was the London naturalist T. H. Huxley, who had joined up halfway through a medical degree because he couldn't afford to continue. Huxley had just two years of childhood schooling and never completed a degree course. But through sheer brilliance he eventually became the champion of the theory of Darwinian evolution in the UK, and probably the most outstanding British zoologist of his generation. He was the first of the Huxley dynasty of scholars and savants. At the time he joined the *Rattlesnake*, however, he had yet to make his mark, and he was simply a mid-course student.

That changed fast. From the first few weeks of the voyage Huxley especially studied gelatinous planktonic creatures, specializing in the enigmatic and poorly known siphonophores. Starting with a detailed account of the most complex, the Portuguese-man-o'-war *Physalia physalis*, he eventually produced a masterly review of all 'sea jellies' and the world's first serious attempt at understanding the anatomy and homologies of the difficult Siphonophora. He posted his finished manuscripts home when he could. They were published quickly, so his exceptional ability was widely known while he was still on the voyage. On his return he was made FRS at the tender age of twenty-six, and, after leaving the Navy, embarked on a brilliant zoological career. He thenceforth remained a Londoner, working and lecturing in South Kensington at the School of Mines which eventually evolved into the Royal College of Science. Here, despite his growing fame, he reached down to initiate and take part in series of 'Lectures for working men'. In this he identified the growing appetite for cultural stimulation resulting from improved social well-being in the country. This need resulted in, among many social changes, the founding and growth of amateur natural history societies such as the forerunners of the London Natural History Society (which traces its roots back to 1858). The study of natural history would no ionger be the province of the leisured rich.

There was a second naturalist on the *Rattlesnake* expedition. The twenty-eight-year-old John MacGillivray had already spent four years as naturalist on a surveying expedition around Australia (on HMS *Fly*). He later worked at the Sydney Museum and became a noted authority on Australasian natural history. He was the son of the Outer Hebridean William MacGillivray, the brilliant bird artist and respected friend of Audubon, and who was during the time of the expedition Professor of 'Civil and Natural History' at Aberdeen. Huxley was one of eight children of an Ealing schoolmaster. MacGillivray senior had been raised from the age of three by an uncle on a farm in the Outer Hebrides. Both families had known poverty. Maybe a similar understanding of underprivilege helped the close rapport that Huxley and MacGillivray junior enjoyed in the testing environment of the ship, and enhanced the eventual contribution each made to natural history.

The book reads well. It has thirty-five well-chosen coloured illustrations, mostly from contemporary sources. There are numerous fascinating anecdotes. For example, the story of one Mrs Barbara Thompson who, being the sole survivor of a shipwreck in North Queensland, was cared for and lived with Aborigines for four to five years until found by the *Rattlesnake* expedition. By this time her clothes had disintegrated and she had only a barely adequate piece of seaweed for modesty. The book will fascinate those interested in sea voyages, exploration, Australian history, Aboriginal culture, and the London naturalist T. H. Huxley. I enjoyed it.

PAUL F. S. CORNELIUS

The Rattlesnake was launched at a meeting of The Linnean Society of London on 17 March 2005 at which its author delivered a gripping and compelling lecture, 'Huxley and the *Rattlesnake*'. Ed.

Report of the second London ladybird survey, 2003–2004, with notes on 'new' species, especially *Harmonia axyridis*, the multivariate Asian ladybird

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Abstract

Ladybird records are summarized and the arrival of 'new' species, including the potentially problematic *Harmonia axyridis*, are noted.

Observers and observations

Contributions were received from 56 (2003) and 52 (2004) people, declining from 76 in 2002. Figure 1 illustrates the frequency of records across our area as an indication of recorder effort. Middlesex is well covered with a strong core of observers in Haringey, Camden, Barnet and Harrow. The most significant gaps are in the outer SE boroughs and rural areas. Table 1 lists the records for 2002–4. No attempt has been made to adjust for recorder effort but, due to variation in numbers of recorders, one would expect records for 2003 and 2004 to be roughly 73 per cent and 68 per cent of the 2002 numbers. The numbers of the less-common species are clearly affected by chance encounters: the high numbers of water ladybirds in 2002 relate largely to populations on the banks of the River Rom (Fred Linehan) which were not investigated in subsequent years. Similarly the apparently large increase of 16-spot ladybirds in 2004 is due to a single mass occurrence at Waltham Abbey (Diane Andrews). Of the more common species, the 2-spot has maintained fairly consistent levels while other aphidophages, notably the 7-spot, declined considerably during 2003. The decrease of the 7-spot was quite sudden during the hot, dry summer of 2003 with ladybirds dispersing in search of aphids. This dispersal is particularly evident from the parallel Essex Ladybird Survey (Mabbott 2005): in Essex large numbers of 7-spots were intermittently seen during July and August, progressively closer to the coast. Numbers of most species recovered during the warm but wetter summer of 2004 which seems to have particularly favoured the mildew-eating 22-spot and orange ladybirds.

'New' and exotic species

There have been two amendments to the British list. The small coccinellid ***Scymnus interruptus*** was belatedly added (Denton 2004) although it had been recorded in Britain previously. Anthony Allen (pers. comm.) found this on the sea wall of the Thames marshes near Belvedere in 1986. The **13-spot ladybird** *Hippodamia tredecimpunctata* has been viewed as a dubious or extinct member of the British list but was recently found in Cornwall (Alexander 2004); this marsh-dwelling species has yet to be found in the London Area. **Heather ladybird** *Chilocorus bipustulatus*, is not a new species but the finds of Max Barclay in Chelsea are noteworthy. The specimens are smaller and darker

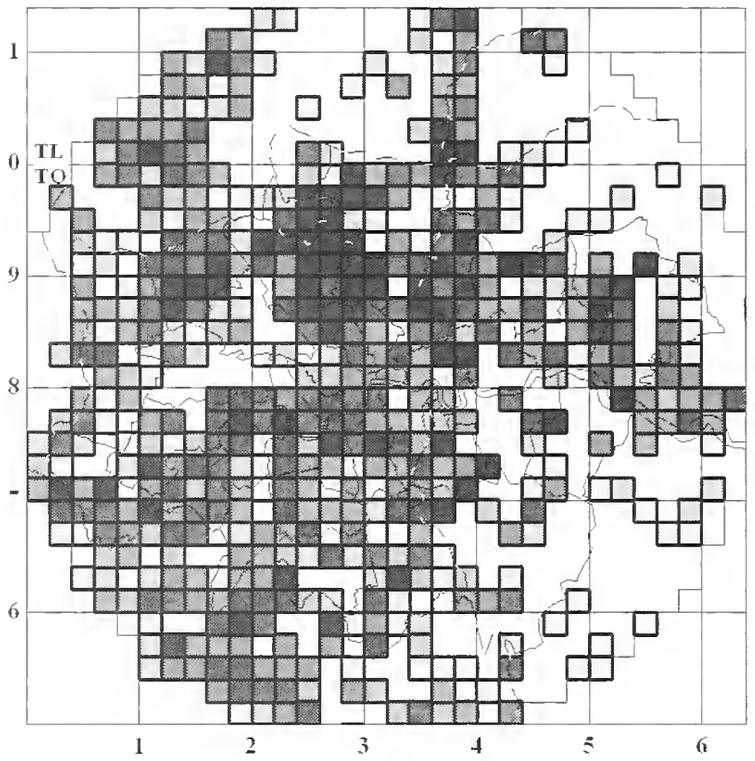

FIGURE 1. Frequency of records for all species, 1999–2004.

than normal British ones and have no affinity for heather. They most closely resemble specimens from Italy and are presumed to have been imported on ornamental plants. ***Cryptolaemus montrouzieri*** is extensively used to control mealybugs in greenhouses although it has been known to survive transiently out of doors (Halstead 1999). Peter Hodge found a single animal on ivy in September 2004 while searching for vedalia beetle in Chelsea. The **vedalia beetle** *Rodolia cardinalis*, was found in a pub garden in Chelsea and subsequently on street trees during 2003 (Salisbury and Booth 2004). It is perhaps surprising that this Australian ladybird has not been found in Britain before. It was the first insect to be successfully used for pest control when it was imported to California in 1888 against the cottony cushion scale *Icerya purchasi* in citrus orchards. It has subsequently been employed around the world and is well established in southern Europe. It is not surprising that the Chelsea appearances coincided with the establishment of *I. purchasi* in Britain (Watson and Malumphy 2004). The beetle prefers warmer climates and may not establish: it was not reported during 2004.

The vedalia beetle has a very restricted prey range and, should it survive London winters, will be dependent upon the presence of the one species of scale. Another ladybird was found in Britain during 2004 that will not be limited by either the climate or prey availability. The **multivariate Asian ladybird** *Harmonia axyridis* originates from NE Asia and has the broadest prey range known in any coccinellid. It is cold-tolerant but might prefer winters drier than those in Britain. It appears to out-compete other ladybirds for aphids and is a major predator of ladybirds and other insects. Introductions of unknown provenance to the south-east USA led to its establishment about twenty-five years ago with subsequent spread across USA and Canada. There appear to have been population declines of most native ladybirds as well as other insects. The ladybird has built up large populations, mainly in urban areas, which often cause a nuisance to humans by entering homes in the autumn. Despite this history, the species has been widely released in southern Europe and has spread north establishing in Germany in 2000 and Belgium and the Netherlands by 2002. During the summer, tens of thousands of *H. axyridis* were seen across the Low Countries with large numbers on the Belgian coast in August. The first British report came from a pub garden in north Essex in September 2004 but retrospective records came from light traps on

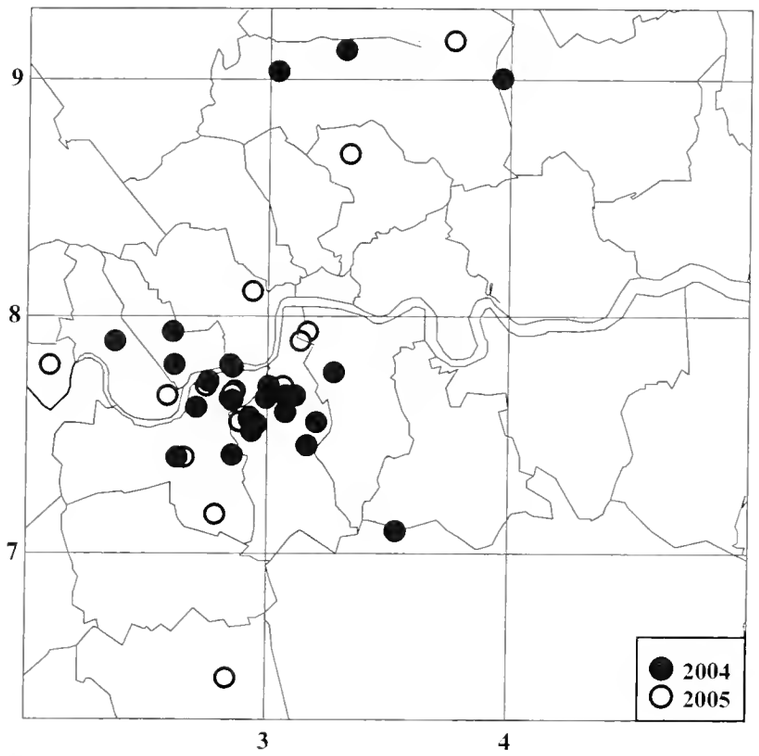

FIGURE 2. *Harmonia axyridis* in inner London, autumn and winter, 2004–2005.

the Essex and Suffolk coasts during August and a larva had been found in Norwich in July. During October large numbers of ladybirds were seen which were mainly coastal and singular although small clusters were found in Ipswich and Colchester. One record was of a pupa on imported supermarket cut flowers and individuals were found as far away as Derby and Burnley. However, the largest concentrations of the ladybird were in south-west London in an area stretching around Clapham Junction and the New Covent Garden Market. Most of these were found on street or park trees, especially lime and sycamore, and included larvae and pupae. It was less common north of the Thames although there was a colony on the Chelsea Embankment (opposite Battersea Park and next to the grounds of the Chelsea Flower Show). There have been isolated reports from elsewhere in London (from Harlow in the north to Sevenoaks in the south, Turnham Green in the west but none along the Thames eastward: see Figure 2); these were mainly individual imagines although Diane Andrews found pupae on a railway embankment in Wood Green. Larvae and pupae were present until early November so at least two generations were present. At the time of writing, all collected pupae from London had successfully eclosed with no evidence of attack by parasitoids. However, one pupa from Essex (collected by Nigel Cumming) was attacked by the braconid *Dinocampus coccinellae* suggesting that parasitoids might control excessive population growth to an extent. An interesting phenomenon is that a considerable proportion of British specimens have been melanic in contrast to the American experience of mainly red ladybirds, commonly with reduced spot numbers. Koch (2003) has summarized the recent history of the species. It is likely that many of the late-emerging ladybirds will not have survived the winter but one was found in Chiswick during February 2005 (Mick Massie) and another was active in a Southwark garden: it is not impossible that many will survive. The potential to severely disrupt populations of other predatory invertebrates is of concern and monitoring is essential. A national monitoring scheme has been instituted (www.harlequin-survey.org). Meanwhile an earlier adventive species, the **bryony ladybird** *Epilachna argus,* continues to disperse at a more leisurely pace. It has not progressed further north or east than noted previously (Mabbott 2003) although it has reached Fairmile Common in the south (Gavin Hawgood) and Horton and Wraysbury in Buckinghamshire to the west. John Muggleton (pers. comm.) calculates that its westward spread is progressing at one kilometre per year.

TABLE 1. All coccinellid species reported during 2002–2004.

Species		2002			2003			2004		
		Records	Individuals	Mean	Records	Individuals	Mean	Records	Individuals	Mean
Coccinella septempunctata	7-spot	642	6,515	10.1	221	431	2.0	604	2,977	4.9
Adalia bipunctata	2-spot	613	3,329	5.4	608	2,908	4.8	627	2,930	4.7
Exochomus quadripustulatus	Pine	323	3,762	11.6	314	2,330	7.4	257	1,488	5.8
Propylea quattuordecimpunctata	14-spot	130	408	3.1	49	61	1.2	118	339	2.9
Halyzia sedecimguttata	Orange	131	411	3.1	63	367	5.8	114	598	5.2
Psyllobora vigintiduopunctata	22-spot	91	181	2.0	58	120	2.1	75	450	6.0
Adalia decempunctata	10-spot	54	134	2.5	57	124	2.2	104	174	1.7
Subcoccinella vigintiquattuorpunctata	24-spot	39	157	4.0	15	27	1.8	65	234	3.6
Calvia quattuordecimguttata	Cream-spot	31	41	1.3	26	26	1.0	56	70	1.3
Chilocorus renipustulatus	Kidney-spot	29	59	2.0	13	16	1.2	8	23	2.9
Anisosticta novemdecimpunctata	Water	20	374	18.7	2	2	1.0	3	6	2.0
Tytthaspis sedecimpunctata	16-spot	17	86	5.1	15	20	1.3	24	1,227	51.1
Epilachna argus	Bryony	16	51	3.2	7	9	1.3	14	69	4.9
Hippodamia variegata	Adonis'	15	49	3.3	12	19	1.6	13	28	2.2
Harmonia quadripunctata	Cream-streaked	15	26	1.7	16	21	1.3	26	34	1.3
Rhyzobius litura	Small brown	10	17	1.7	4	6	1.5	4	6	1.5
Coccinella undecimpunctata	11-spot	6	8	1.3	1	2	2.0	2	2	1.0
Rhyzobius chrysomeloides		5	6	1.2	1	1	1.0	2	6	3.0
Chilocorus bipustulatus	Heather	4	7	1.8				3	3	1.0
Nephus quadrimaculatus		3	3	1.0				2	6	3.0
Clitosthetus arcuatus		2	14	7.0						
Anatis ocellata	Eyed	2	3	1.5	3	3	1.0	7	7	1.0
Coccidula rufa		2	2	1.0	1	1	1.0	1	1	1.0
Scymnus suturalis		1	31	31.0	2	2	1.0	3	3	1.0
Myrrha octodecimguttata	18-spot	1	1	1.0	1	1	1.0			
Aphidecta obliterata	Larch	1	1	1.0	2	6	3.0			
Rodolia cardinalis	Vedalia				2	3	1.5			
Harmonia axyridis	Multivariate Asian							35	203	5.8
Cryptolaemus montrouzieri	Mealy-bug							1	1	1.0
Scymnus frontalis								1	1	1.0

Summary

The survey continues to provide useful ladybird data and, particularly, aids monitoring of adventive species. Numbers of observers seem to have stabilized at a useful level.

Acknowledgements

My thanks to Michael Majerus and Antoon Loomans for records and advice of *Harmonia axyridis*. Continuing thanks to all contributors of records including new reporters: Sheila Ayres, Margaret Bedwell, Kathleen Black, Michael J. Bleckwen, J.P. Brock, Stuart Cole, Joan Cozens, Clare Debenham, Amanda Eldred, Rosemary Etheridge, Henri M. Gassend, Chris Gibson, Martin Henderson, Ron James, Claire Johnstone, Andy Keay, Mick Massie, Donald A. Prance, Y. Sharp, Amy Solovitz, Mike Trier, Amanda Waterfield.

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Book review

Butterflies of Europe. New field guide and key. Tristan Lafranchis. Diatheo, 35 rue Broca, F-75005, Paris. 2004. Many colour photographs, 351 pp. Softback, £20 / €30, plus £4 p. & p. ISBN 2 9521620 0 X. E-mail: lafranch@otenet.gr

Butterflies of Europe is a further addition to the range of field guides that is available for the identification of European butterflies. The book is set out as a key accompanied by annotated photographs of live butterflies from the wild. There are 1,300 photographs, usually of good quality and thus providing a useful aid to identification. Except for some of the smaller species, all are shown at their natural size.

The keys are based primarily on details of the external anatomy, wing markings and wing venation, with an emphasis on those characters that can easily be identified in living butterflies. One consequence of this is that the male and female clouded yellow *Colias croceus* key out eight pages apart. Users of the keys may need to cross-reference the couplets of the key with the explanatory diagrams on the inside front and back covers, and with the glossary. Some of the keys also make reference to geographical distribution of species as a distinguishing factor. Sketches of the male genitalia are provided for difficult to identify species amongst the graylings *Hipparchia*, skippers *Carcharodus* and fritillaries Melitaeini. Instructions are provided for examining the genitalia in the field without apparently harming the butterfly.

The distribution maps, for the whole of Europe, measure 2.5 × 2.5 cm and do not allow for much regional detail. The map and text for the wall brown *Lasiommata megera*, for example, gives the impression that this species is widespread and common in the London area, which has not been the case since the early 1990s.

The new name for the large skipper is given as *Ochlodes sylvanus* because a former name, *O. venatus*, actually belongs to a species from eastern Asia. (An internet search reveals that *O. venatus* (Bremer and Grey 1853) is a synonym for *O. venata* which has been in recent use in the UK, while the name *O. faunus* (Turati 1905) may be familiar to some. *O. sylvanus* (Esper 1778) appears to bring the species back to the original name.)

Produced by a team from France, Greece and Britain, the text is in English. A range of text styles is used which some readers may find trying. The cover alone displays seven variants of text in just fourteen words. In size, the paperback measures 19.5 × 13 cm and is 2 cm thick, and is thus more suited for carrying in a bag than a pocket. While this book may not appeal to all, others may find it a refreshing approach.

LESLIE WILLIAMS

Spider records for 2004 for the counties of London and Middlesex

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Abstract

New and interesting spider records for the counties of London and Middlesex in 2004 are detailed. There were two new records for London and one new record for Middlesex.

Introduction

In 2004 altogether only 180 species were recorded in the two counties of London and Middlesex (compared with 213 in 2003), of which were two new to London and one was new to Middlesex.

This was in spite of the fact that pitfall trapping was conducted at several sites including, for the first time, Mile End Park (London). Longer-term trapping has continued at Blackheath and Hampstead Heath (London), at Harmondsworth Moor and several sites near Heathrow Airport (Middlesex) including the constructed reedbeds and Camp 4 Conservation Area. Pitfall trapping continues at Queen's Wood.

Two spider forays were held in May. At Mile End Park a foray open to the public was very successful with over fifty people attending including twelve children, while the Society's foray to Horsenden Hill and then Camp4 Conservation Area (thanks to the help of Clive Jones, BAA's Water Quality Officer, who granted us access to this closed site) attracted a smaller number of keen members. Unfortunately the writer was not able to lead the Society's foray in early December due to ill health, but that did not stop several members meeting at Hounslow Heath, and led by Mick Massie they found at least one spider new to the site, the linyphiid *Centromerita bicolor*.

The two most spectacular London spiders, *Atypus affinis* and *Argiope bruennichi* and the newest, *Macaroeris nidicolens* were all seen this year. The tube-web spider *A. affinis* was again taken in pitfall traps at both Blackheath (October) and Hampstead Heath (February).The wasp spider *A. bruennichi* was seen in late summer at more than twelve sites (all new) in London and Middlesex. There were no sightings on the Ladies' Swimming Pool Meadow, but one female was found on the adjacent Stock Pond Meadow. *M. nidicolens*, the salticid new to Britain discovered in 2002, was still present on pines at Mile End Park this year. During the public spider foray mentioned above an adult female was swept from one of the pines on the Green Bridge.

In the list below those marked * are new to London and those marked ** new to Middlesex. All records are by the writer unless indicated. Trapped means pitfall-trapped unless otherwise stated. Nomenclature and the new order in the list of families are according to Merrett and Murphy (2000).

LINYPHIIDAE

Tapinocyboides pygmaeus. This *Red Data Book* spider is already known from two areas on Hampstead Heath where it is thriving. In December a single male was trapped at West Field Bog, on the adjacent Kenwood Estate.

Lessertia dentichelis. As reported last year the only known London site (still in existence) for this uncommon spider was Regent's Park, but in 2004 a single male was trapped at Mile End Park in March. A single male was also trapped at Two Bridges Farm Nature Reserve in March.

*Syedra gracilis** (Nationally Notable B). A single male of this tiny, rare grassland linyphiid was trapped at Mile End Park in May.

LYCOSIDAE

Pardosa nigriceps. This spider is very uncommon in London; occasional specimens have been found on Hampstead Heath, and one at Sydenham Hill Wood. This year a single male was trapped at Mile End Park in June.

HAHNIIDAE

Hahnia montana. A fairly common species nationally but rare in the London area and restricted to ancient woodland (Oxleas Wood, Bostall Heath) or relic grassland (Barnes Common), was trapped at Queen's Wood (Middlesex) for the first time. Since pitfall-trapping has been continuous at six sites in the wood since 1989, this is a surprising find suggesting that some species like *H. montana* may be able to exist at very low densities within a habitat like a wood, and may be very choosy about the places in a wood where they live. Readers may have other hypotheses about this finding.

This is only the second site known in Middlesex for the species after Stanmore Common, although there may be earlier records from elsewhere on which Locket et al. (1974) based their inclusion of Middlesex in the known distribution of the species.

AMAUROBIIDAE

*Coelotes atropos***. This spider is common nationally but 'very rare in the south-east of England' (Harvey et al. 2002). A single female trapped in woodland at Camp4 Conservation Area near Heathrow was the first record from Middlesex. It is also known from the Stock Pond Wood on Hampstead Heath (Milner 1996).

GNAPHOSIDAE

*Haplodrassus silvestris** (Nationally Notable B). This rare gnaphosid, known from a few woodland areas across the south of England, was recorded in 2004 from the central woods at Hampstead Heath. Two males were trapped in a coppiced area in June. This exciting find suggests that perhaps some part of the woodland below Hampstead Gate is ancient; there are some of the oldest oaks on the Heath in that area, and there may be some woodland cover in the area that is much older than was thought. Most of the woodland on the Heath is secondary, and little or none was considered ancient woodland in the generally accepted sense of having had continuous cover for at least 400 years.

SALTICIDAE

Heliophanus cupreus. This spider is recorded from Middlesex according to Locket et al. (1974), but no specific localities were given; in 2004 a single male was beaten from bushes at Camp 4 Conservation Area during the Society's spider foray in May.

Acknowledgements

I wish to thank Peter Merrett and Peter Harvey for identifying or confirming the identity of most of the species referred to. Thanks are also due to the Corporation of London, British Airways, British Airports Authority and London Borough of Tower Hamlets for supporting the spider surveys in areas within their spheres of influence.

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Book review

The New Naturalists. Edition 2. Peter Marren. New Naturalist 82. Collins, London. 2005. 363 pp. Hardback, £40, ISBN 0 00 7197 16 0; softback, £25, ISBN 0 00 7197 15 2.

The first edition of this fascinating book appeared in 1995 at a price for the hardback of £30, and was reviewed in the *LN* for that year (*The London Naturalist* **74**: 179–180). Points made then are mostly not repeated here. The first edition was a celebratory review of the New Naturalist (NN) series for its first fifty years and of the Monograph series (sadly defunct since 1971). From their inception the series were a prominent and unique publishing enterprise in the natural history world. In the somewhat austere post-war 1950s the natural history movement itself was a very much smaller lobby than it is today, and there weren't many books. The series were able both to reflect, and even focus, the movement's aims and ambitions. It sought and attracted authors who were among the major players of the day. It was no accident, for example, that the eventual second Director General of the Nature Conservancy (1952–1966), the late Max Nicholson (a former London Natural History Society honorary vice-president, obituary in *LN* **82**: 261–262, 2003), contributed to the series a greatly applauded book, *Birds and Men* (1951, NN 17). His book, then perhaps uniquely, spanned between academia, amateur natural history, agriculture and other land-use, in an approach that today we would unhesitatingly recognize as one of pragmatic conservation — the art of the possible. Most other books in the series were also both enjoyable and seminal. Virtually all naturalists who were young then were influenced by them. At the time, they were essential reading.

The new edition of the present book, celebrating sixty years of the series, is 59 pages longer than the first, but largely reprints it without change. Essential information on the new titles published in the meantime is given uniformly with the presentation in the first edition. A table on page 179 of the new edition gives the ages of NN authors when their (first) books were published but the new authors of the past ten years are not incorporated, which seems careless. The pagination of the two editions is identical up to page 245 except that the new edition has four extra pages of an additional foreword at the beginning which increases the number of every page up to that point by four. Till then it is virtually the same intriguing book. The print runs of all past NNs are listed as before: the first printings of the present edition were hardback, 1,600 copies, softback 1,200 (data from Harper Collins as at July 2005). The first edition, Marren tells us, comprised 2,000 hardback (first printing 1,500) and 1,750 softback, somewhat fewer than more recent NNs.

The same coloured plates and black-and-white (b/w) frontispiece are reproduced excepting changes to Plates 12–14. These now show some of the dust-jacket designs for NNs of the past ten years, instead of some submitted artwork which had not been used. Comparing my own first-printing copies of the two editions, both coloured and b/w plates are better reproduced in the new edition, excepting the frontispiece which is slightly less clear. A new twenty-nine-page chapter, 'Ten years on', gives an account of the new books, their authors and the designing of their dust jackets and softback covers. There are thirteen new titles plus the new edition reviewed here. Eight of them are on previous NN subjects updated. A few of the dust jackets of the thirteen new books are reproduced additionally to those on Plates 12–14, but only as b/w illustrations inserted in the text. This is unfortunate since one of the latest NNs, *Fungi*, published in 2005, has all its illustrations in colour. Reproductions of more of the wonderful recent jackets by Robert Gillmor would have been a nice addition to the new edition at, surely, an acceptable cost given that the first edition must have paid for itself during the two years it took to sell out. Marren's account of the production method of the Gillmor jackets is fascinating. A notable improvement in the series is that most of the recent wrappers are of more robust paper (that of *Fungi*, however, is not).

An updated section of short biographies follows. Some, such as that of the late J. Morton Boyd, incorporates much new material, and the new NN authors are added. One unfairness remains. The Londoner and long-time LNHS member, Eric Simms, is still one of just two authors to have written four NN titles (the other being L. Dudley Stamp), but his entry in the revised Biography section has increased from just nine lines to a monstrously inadequate ten. The added line suggests he has been parochial, as Gilbert White was to Selborne, but he is of course a widely travelled naturalist. Meanwhile Leslie Brown (NN 60, *British Birds of Prey*, 1976) gets nearly 300 lines of new text, or five and a half pages. It is a fascinating account of Brown's work on his acclaimed NN, but quite out of place in this section about NNs since 1995. Better it should have been slipped into the main text, and the pagination adjusted as it was to accommodate the extra Foreword. The LNHS is still the only society to have written a title, *Birds of the London Area since 1900* (NN Monograph 14, published 1957, second edition 1963); but the editors of the two editions, R. C. ('Dick') Homes and Rupert Hart-Davis respectively, are still not included in Marren's biographical section. However, a half-page account of the book does appear, identically in the two editions (pages 190 and 194 respectively).

The 'Collectors Guide' section is amended to account for market changes affecting NNs, and indicates which are the rare ones. This is followed by a one-page section 'Collecting NNs in 2005'. Next is a new one-page appendix, on six Australian natural history books, quasi-uniform with NNs, published by Collins in Sydney, unnumbered and with slightly different format. They treated (marine) Fish, Insects, Birds, Spiders, Frogs and a coral island on the Great Barrier Reef called One Tree Island (not the Essex one!).

Six pages of Notes follow, these being addenda to the original main chapters. Two of these pages comprise a defence from Michael Majerus (author of NN 90, *Moths*, 2002) of the work by E. B. Ford (NN 30, *Moths*, 1954, second and third editions 1967, 1972), Bernard Kettlewell and others on industrial melanism in the peppered moth *Biston betularia*. Some of this work was done in the LNHS area, in Kensington squares. This defence arguably warranted just a reference to some similar account published elsewhere, not least because Ford now occupies twenty-eight pages of the book, or nearly 8 per cent of it. Be this as it may, Majerus advises us that their supposedly fraudulent study has in fact been backed up by later work. This is reassuring since the example has been widely used in the teaching of evolutionary principles for nearly half a century. Finally, a postscript section includes an amusing article first published in the Newsletter of The New Naturalists Book Club about an imaginary NN title, and a couple of shorter pieces in the same vein.

One pleasing idiosyncrasy of the series has survived since its inception. As with the early Penguin books, the book's number in the series appears only on the spine of the wrapper or cover, and nowhere on the title pages or text. This will continue to confound librarians who automatically discard wrappers, and serve them right! The softback editions are not numbered at all.

Some aspects of the book as published would have disquieted the original editors of the series. A brief glance indicates that the index of the new edition has been repaginated. However, it seems to have many errors. I checked just a dozen entries and spotted that 'Heathlands' appears on page 226, not 227; and that 'Caves and cave life' is mentioned on page 283, not 280. On my first use of the index actually to locate some text I found that the entry for 'Moths (Majerus)' starts on page 345, not 346. The several references to James Fisher and Julian Huxley on page 343 are not indexed, nor the important one about E. B. Ford starting on page 344. I did not check further, and my point is made. But when, oh when, will publishers learn that the last job of all is to prepare the index, even though this holds up production of an otherwise completed book? There is more. Some typos I spotted when reading the first edition, and mention of which I purposely omitted from my review of it (*LN* for 1995, cited above), have not been corrected. Hardy still appears out of sequence in the index; the caption on page 139 (second-edition pagination) still includes the name 'Couttts'; the last paragraph on the new page 144 still includes the word 'exclained'; the table on page 111 still omits the second edition print-run without comment; and on page 210 the penultimate line still reads 'I said the policeman' (should be 'I said *to* the policeman'). Sir Maurice Yonge was author of two really excellent NNs, *The Sea Shore* (1949, NN 12) and *Oysters* (1960, NN Monograph 18), but is still not included among the short list of knighted NN authors on page 242, though his knighthood (awarded in 1967) is mentioned on pages 275 and 310. The new illustration of two authors on page 252 has no caption. 'Boswall (1982)' is cited on page 266 but the reference does not seem to appear. These are just my own casual observations — I was not the book's proofreader, nor did I scour it for mistakes. Most of these errors would have been picked up by simple, domestic word-processing software, and one expects better of a publisher of this calibre. Finally, the top margin is absurdly narrow throughout the book, varying slightly and down to a miniscule 4 mm on page 304 of my copy. Any bookbinder will tell you that is useless. This feature of recent NNs is at last redressed in *Fungi* (NN 96, 2005), however: it has adequate margins and line-spacing, making a nice fat book with the text much easier to read, and still within the same price tag.

Don't let the publishing oversights I have mentioned put you off. If you didn't buy the first edition, get this one. It is a fascinating read for all the same reasons that the first edition was. If you have the first edition, judge whether to buy it from the additions indicated above; but if you are a library, it is a second edition that may be too similar to the first to make you want it. For me, however, there was a surprise bonus. The new edition tells me that the value of my copy of the first edition has increased in the intervening ten years from £30 to £200! All very well, but I cannot imagine ever selling one of my treasured NNs, can you? And certainly not this one, which is among the most interesting and readable of them all.

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London butterfly monitoring report for 2004

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Abstract

Butterflies were monitored by the use of transect walks at twenty-six sites in London during 2004. Data from these transects were used in the calculation of collated indices for London.

Introduction

Changes in the abundance of butterflies in London in 2004 as compared with previous years are reported in this paper, primarily using data from sites where butterflies were monitored. London is defined for the purposes of this paper as Greater London or the area encompassed by the London boroughs, though additional records from the wider London Natural History Society (LNHS) recording area are noted.

Methods

Monitoring was undertaken by the transect walk method, a standard method adopted throughout the United Kingdom. Details of the method have not been repeated here as they are described elsewhere (see Pollard and Yates 1993 and Williams 2000 and the references cited there). At each site a walk was undertaken along the same route, each week, between April and September inclusive, within a standard range of weather conditions conducive to butterfly flight. Counts were made of the number of adult butterflies observed to provide a total for each species for the year at each transect. Totals used for this paper include calculated estimates for weeks missed due to poor weather or the unavailability of the recorders. However, for inclusion in the index, data needs to have been obtained by walking the transect with good coverage during the recording season and the minimum of missed weeks. Collated indices were calculated from the data as described by Williams (2000), but see also Crawford (1991) for an introduction to the use of collated indices in wildlife monitoring; and also Pollard and Yates (1993) and Roy and Rothery (2002). Note that neither the original site counts nor the collated indices are absolute counts of the population, but indices of abundance. The indices are relative from year to year, not from species to species. Indices were collated from transects for which there was suitable data available for at least two years.

Twenty-six of these transects were walked in London with sufficient coverage in 2004. These transects and the years for which they contributed data are listed below, the 2004 recorders are listed in the Acknowledgements, and the borough in which the transect is located is given in parentheses: **Hampstead Heath** (Camden) 1978–2004; **Fryent Country Park** (Brent) 1986–2004; **Beane Hill** (Brent) 1988–2004; **Gutteridge Wood** (Hillingdon) 1990–2004; four transects managed by the Corporation of London (located in the London Borough of Croydon): **Coulsdon Common** 1990–2004, **Farthing Downs** 1990–2004, **Kenley Common** 1990–2004, **Riddlesdown** 1990–2004;

Clifford Road Allotments/New Barnet Allotments (Barnet) 1994–1995, 1997-2004; **Mitcham Common 'route A'** (Merton) 1994–2001, 2003–2004; **Mitcham Common 'route B'** (Merton) 1995–2004; **Forty Hill** (Enfield) 1996–2002; **Wandsworth Common Woodland** (Wandsworth) 1996–2003; **Wildfowl and Wetlands Trust Wetland Centre at Barn Elms** (Richmond upon Thames) 1996–2004; **Railway Fields** (Haringey) 1997–2004; **Cranford Park** (Hounslow) 1997–2004; **Hutchinson's Bank Nature Reserve** (Croydon) 1997–2004; **South Norwood Country Park** (Croydon/Bromley) 1998–2004; **Trent Country Park** (Enfield) 1998–2004; **Tower Hamlets Cemetery Park** (Tower Hamlets) 1999–2004; **Abney Park Cemetery** (Hackney) 1999–2002; **Gunnersbury Triangle** (Hounslow) 1999–2004; **Roxborough Rough** (Harrow) 1999, 2001–2004; **Brent Reservoir** (Barnet/Brent) 2000–2004; **Elthorne Waterside** (Ealing) 2000–2003; **Featherbed Lane Roadside Verge/The Gallops** (Croydon) 2000–2003; **Hounslow Heath** (Hounslow) 2001–2002; **Cranebank** (Hounslow) 2001–2004; **Regent's Canal towpath from Mile End Road to Mare Street** (Tower Hamlets/Hackney) 2001–2004; **Highgate Cemetery** (Camden) 2002–2003; **Minet Country Park** (Hillingdon) 2002–2004; **Minet Site BWB land** (Hillingdon) 2002–2004; and **Chapel Bank** (Croydon) 2003–2004.

Limited transect data for 2004 was also received from Featherbed Lane Roadside Verge/The Gallops, Regent's Park, West Wickham Common, Spring Park, Farthing Downs New Hill, Riddlesdown Quarry, and Happy Valley. Records from these transects and from casual records by LNHS observers have been included in the species accounts where appropriate. Records also contribute towards the county and national databases maintained by Butterfly Conservation.

Results

The species accounts below are based on the collated indices. Indices for 1994 to 2004 are presented in Table 1. The order and nomenclature follow Asher et al. 2001. Estimates of the relative changes in the populations of each species from year to year are given by the difference in the indices. For example, a species with an index of 50 in one year and 25 in the following year would have had approximately half the adult population in the second year as compared with the first year. Indices have been rounded to the nearest whole number and have usually been set at 100 in 1990 or the first year of record: for a technical discussion see Crawford (1991). Reliability of the indices increases with the number of transects: one transect was walked in 1978, two in 1986, three in 1988, eight in 1990 and 26 in 2004. Reliability of the indices may be lower for species with low counts. The 'Total count on transects' provides an indication of the size of the count from which the analysis was made in 2004 using the data from the 26 complete transects including estimated counts for missing weeks; but excluding the computed estimated counts for transects that were not walked or had insufficient data in 2004.

Small skipper *Thymelicus sylvestris* and Essex skipper *Thymelicus lineola*

Small and Essex skippers are generally counted together by transect walkers due to the difficulty of separating these species in flight. Small and / or Essex skippers were recorded on all but one, inner London, transect. Populations were higher on sites with rough grasslands on acid, neutral and chalk soils. The index for the combined populations was similar to that of recent years. At ten transects, attempts were made to identify a sample of the two species separately. Though proportions varied between sites, small skippers appeared to be more common than Essex skippers. Total count on transects: 2,141.

TABLE 1. Collated indices for butterfly species in London, 1994–2004. Indices have been rounded to the nearest whole number and have usually been set at 100 in 1990 or the first year of record, though indices may be set at 100 in other years or at a different figure where this aids interpretation. A blank indicates no transect records for that species in that year. A zero implies that that species was not observed on transects in that year. A question mark indicates that a species was present in that year, but that data for subsequent years and/or for more transect sites is required before the calculations can be completed. See the text for further information.

	1994	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
Small and Essex skippers	248	113	176	167	95	108	91	106	82	87	92
Large skipper	212	144	72	64	43	65	60	44	76	107	72
Dingy skipper	?	?	?	100	58	51	63	33	46	121	80
Grizzled skipper	?	?	?	100	25	63	27	16	47	41	82
Clouded yellow	0	0	100	0	109	0	2,255	0	62	114	118
Brimstone	74	124	106	94	83	82	129	99	98	86	126
Large white	115	138	47	146	284	131	138	119	187	128	156
Small white	120	246	110	318	166	96	141	126	159	182	267
Green-veined white	73	147	58	140	186	94	102	65	105	81	104
Orange tip	37	73	36	81	65	50	80	66	81	45	67
Green hairstreak	0	91	45	80	40	20	18	71	47	60	74
Purple hairstreak	141	200	119	334	549	464	455	304	467	312	455
White-letter hairstreak	0	40	113	76	34	17	17	37	21	26	18
Small copper	44	70	69	74	63	43	24	6	4	65	58
Small blue	?	?	?	100	225	175	188	338	0	38	25
Brown argus	61	100	81	98	11	12	20	7	7	45	41
Common blue	91	144	59	79	40	76	63	38	38	127	58
Chalkhill blue	91	109	109	288	75	180	90	80	41	41	93
Holly blue	4	85	101	20	67	40	47	56	43	46	67
White admiral					100	0	0	0	0	0	100
Red admiral	123	312	216	107	145	135	276	203	217	442	141
Painted lady	8	11	747	12	8	12	70	9	83	430	44
Small tortoiseshell	184	304	120	303	183	152	72	42	25	66	143
Peacock	486	572	794	785	1,122	1,110	1,503	1,070	648	400	598
Comma	107	143	106	127	133	120	209	156	138	210	151
Dark green fritillary				100	148	181	63	7	11	91	9
Silver-washed fritillary						100	300	100	0	0	0
Speckled wood	227	152	74	125	147	168	181	152	211	237	145
Wall brown	2	1	0	0	0	0	0	0	0	0	0
Marbled white			?	100	61	54	38	14	18	39	26
Gatekeeper	84	120	143	146	115	169	189	165	155	202	259
Meadow brown	91	105	136	117	165	154	151	96	69	144	116
Ringlet	310	193	64	222	292	347	476	241	292	398	219
Small heath	5	6	21	25	19	4	2	1	1	10	8

LARGE SKIPPER *Ochlodes venata*

Large skippers prefer grassland habitat with a higher proportion of shrubs than small and Essex skippers. The species was widely distributed in London. Compared with 2003, numbers declined on most transect sites, though there were marked increases at Riddlesdown and Trent Country Park. Total count on transects: 467.

DINGY SKIPPER *Erynnis tages*

The dingy skipper was recorded on the two transects at the adjacent chalk grassland sites of Hutchinson's Bank Nature Reserve and Chapel Bank in south London, though numbers were lower than in 2003. A dingy skipper was also recorded at Riddlesedown Quarry and at Downe Bank, Bromley. Total count on transects: 77.

GRIZZLED SKIPPER *Pyrgus malvae*

The grizzled skipper was also recorded at Hutchinson's Bank Nature Reserve and Chapel Bank. The index was higher than in 2003 but did not exceed that of 1997 when the London index for this species commenced. Away from the transects there was a record from Downe Bank in Bromley. Total count on transects: 27.

CLOUDED YELLOW *Colias croceus*

Records on transects were confined to Riddlesdown and Hutchinson's Bank Nature Reserve. The most recent large-scale migration for this species in the London area was in 2000 (Table 1). Away from the transects there were records from Downe Bank in Bromley, South Lodge Farm in Enfield, and East Brookend Country Park in Barking in Dagenham (TQ507865). In the wider LNHS recording area there were records from the Walton Reservoirs. Total count on transects: 6.

BRIMSTONE *Gonepteryx rhamni*

Brimstones were recorded on most of the transects. The index was higher than in 2003 though within the range for the years since 1990. The highest counts were from transects on chalk downland sites on the southern edge of London. However a trend was evident of increasing counts from the more urban areas of London. Though there were relatively few monitored transects in London between 1978 and 1990, it was not until 1993 that a brimstone was recorded on a transect situated on a greenspace within urban London. Numbers fluctuated widely for a few years, but the trend was of colonization and increasing populations at new sites in urban London. To some extent the increase at the urban sites may be a consequence of the planting of the main larval foodplants, *Rhamnus cathartica* buckthorn and *Frangula alnus* alder buckthorn at urban nature sites. In 2004, brimstones were also recorded at Regent's Park, Canon Hill Common, Alexandra Park, from a garden in Bromley, and from outer London and the wider LNHS recording area. Total count on transects: 730.

LARGE WHITE *Pieris brassicae*

The large white was recorded on all the transects and the index was higher than in 2003. Total count on transects: 935.

SMALL WHITE *Pieris rapae*

Widely distributed in London, the index for the small white was the highest since 1997. Numbers appeared to be higher at green spaces in urban London rather than at sites in the green belt. Total count on transects: 3,139.

GREEN-VEINED WHITE *Pieris napi*

As for the small white, the green-veined whites appeared to be present in higher numbers at some green spaces in urban London rather than at green belt sites. The index was higher than in 2003 but similar to 2002. Total count on transects: 2,071.

ORANGE TIP *Anthocharis cardamines*

Orange tips have a preference for damp grasslands, and the highest transect counts in 2004 were at Cranebank, Fryent Country Park and the London Wetland Centre. The index increased on that of 2003 but was within the range for recent years. Total count on transects: 376.

GREEN HAIRSTREAK *Callophrys rubi*

Recorded at three transects on the southern edge of London, and particularly at Hutchinson's Bank Nature Reserve and Chapel Bank, with a singleton at Kenley Common. Other records were from Riddlesedown Quarry and at Happy Valley. Total count on transects: 21.

PURPLE HAIRSTREAK *Neozephyrus quercus*

Purple hairstreaks generally fly in the evening and therefore were probably more frequent than suggested by the daytime transects. It is probably widespread throughout London and is associated with oak trees and woodland with oak. There were records from seven transects, with the total largely represented by the Brent Reservoir, Cranebank and Trent Country Park. Other records included those from Canon Hill Common area, Holland Park and Alexandra Park. Total count on transects: 53.

WHITE-LETTER HAIRSTREAK *Satyrium w-album*

The white-letter hairstreak was recorded on the transect at Trent Country Park in 2004. Away from the transects there were records from the vicinity of Trent Park, at Downe Bank in Bromley, and from the Cannon Hill Common area. Beyond Greater London but within the LNHS recording area there was a record from Brickendon Green in Hertfordshire. Total count on transects: 2.

SMALL COPPER *Lycaena phlaeas*

The index was slightly lower than in 2003 but higher than the low indices of 2000–2002. Changes at individual sites were variable, though the highest counts were at transects on sites with relatively large areas of semi-natural grasslands. The highest count was again at Trent Country Park. Total count on transects: 409.

SMALL BLUE *Cupido minimus*

Two small blues were recorded on the transect at Hutchinson's Bank Nature Reserve. Four were recorded during the partial transects at Riddlesdown Quarry. Total count on transects: 2.

BROWN ARGUS *Aricia agestis*

The brown argus was recorded on six transects, primarily on chalk sites on the southern edge of London, though also at Mitcham Common route A and at Cranebank. Away from the transects there were records from South Lodge Farm in Enfield. Total count on transects: 41.

COMMON BLUE *Polyommatus icarus*

In 2004 the index was less than half that of 2003 which was the best year for this species in London since 1995. Though the common blue was widely distributed throughout London, the highest counts were from transects on chalk grassland. Total count on transects: 786.

CHALKHILL BLUE *Polyommatus coridon*
The chalkhill blue is a species of chalk downland and was recorded on two transects on the southern edge of London in 2003. The index fluctuates considerably from year to year. Total count on transects: 64.

HOLLY BLUE *Celastrina argiolus*
Recorded on all the transects. The highest count was again at Tower Hamlets Cemetery Park, where a large disparity between the generations was noted with four holly blues recorded during the spring generation and 150 during the summer generation. Diane Andrews reported a late flying holly blue on 11 November 2004 at Tottenham Cemetery (TQ333911). Total count on transects: 501.

WHITE ADMIRAL *Limenitis camilla*
A white admiral was observed at Hutchinson's Bank Nature Reserve. Beyond Greater London but within the wider LNHS recording area approximately 40 white admirals were reported throughout Bookham Common on 27 June 2004 by Stephen Spooner; and 4 were reported from Broxbourne Wood. Total count on transects: 1.

RED ADMIRAL *Vanessa atalanta*
The index for the red admiral was less than a third that of 2003, with reduced counts evident throughout London. Total count on transects: 135.

PAINTED LADY *Vanessa cardui*
Since 1990 there have been two relatively large migrations of the painted lady into London, in 1996 and to a lesser extent in 2003. In 2004 the index returned to a more typical level and was approximately a tenth that of 2003. Total count on transects: 36.

SMALL TORTOISESHELL *Aglais urticae*
The index for the small tortoiseshell was over twice that of 2003, thus continuing the recent recovery. Zero counts were however still reported from some transects. Total count on transects: 763.

PEACOCK *Inachis io*
The index increased on the relative low of 2003. Total count on transects: 797.

COMMA *Polygonia c-album*
A species of open woodland and woodland edges, such as at Tower Hamlets Cemetery Park. Total count on transects: 513.

DARK GREEN FRITILLARY *Argynnis aglaja*
Recorded from two transects on the southern edge of London, numbers declined considerably compared with 2003. Away from the transects there were records from Downe Bank in Bromley. Total count on transects: 5.

SPECKLED WOOD *Pararge aegeria*
Following 2003, in which the index reached the highest since the monitoring of butterflies commenced in London in 1978, the counts of the speckled wood declined on almost all of the transects. Total count on transects: 2,237.

MARBLED WHITE *Melanargia galathea*
The large majority of the counts were from two chalk downland sites, Hutchinson's Bank Nature Reserve and Chapel Bank. Of the other transects,

the count at the Brent Reservoir was 39, three were recorded at Minet Country Park representing the first transect records there since monitoring commenced in 2002, one at Riddlesdown, and from the partially walked transects at Featherbed Lane Roadside Verge. Away from the transects there was a record from Trent Park and its vicinity and from King George V reservoir in Enfield (TQ370965). Total count on transects: 348.

GATEKEEPER *Pyronia tithonus*

The index for the gatekeeper or hedge brown was the highest since transect monitoring commenced in London in 1978. Numbers at individual transects however varied considerably compared with 2003. It is instructive to consider a sub-set of the index sites based on transects at greenspaces from the more urban areas of London. Though there were relatively few monitored transects in London between 1978 and 1990, the first record of a gatekeeper on an urban greenspace transect was in 1985. The establishment of populations and increasing numbers at greenspace transects in urban London was evident from the mid 1990s. At Railway Fields, the population of the gatekeeper has increased almost annually since 1997. In 2004, the first gatekeepers were recorded on the transect at the Regent's Canal near to Victoria Park since transect monitoring commenced there in 2001. An established population was evident at Regent's Park. Total count on transects: 4,131.

MEADOW BROWN *Maniola jurtina*

Recorded on all of the transects, though local populations appear to be susceptible to changes in local management in addition to regional trends. The count at Fryent Country Park was less than half that of 2003, whereas there were increases at some sites. Total count on transects: 9,711.

RINGLET *Aphantopus hyperantus*

The index was relatively low compared with the years from 1998–2003, though there were increases at some sites compared with 2003. The ringlet is frequent on some sites at the southern edge of London, as on the transects at Chapel Bank, Hutchinson's Bank, Riddlesdown, Farthing Downs, Kenley Common, Coulsdon Common and Featherbed Lane Roadside Verge. Ringlets were also reported at Trent Country Park, South Norwood Country Park, Mitcham Common route B; and one at Cranford Park. A singleton was recorded, but away from the transect, at Gunnersbury Triangle, the second report of this species at that site. There were also records from Alexandra Park, and Park Farm in Enfield. Total count on transects: 928.

SMALL HEATH *Coenonympha pamphilus*

Following a partial recovery in 2003 the index was slightly lower in 2004. The small heath was recorded from approximately a third of the transects. The count from Trent Country Park again represented over half of the total from all transects, followed by Cranford Park and Cranebank. At Cranebank, a large increase in numbers could possibly have been due to the introduction of cattle grazing on the main meadow areas. For London, the species remains far less numerous than it was in the early 1990s and restricted to fewer sites within London. In the wider LNHS recording area there were records from the Walton Reservoirs and Hersham Gravel Pits. Total count on transects: 1,021.

For details of species that were recorded beyond Greater London but within the wider LNHS recording area, reference should be made to the respective county reports produced by Butterfly Conservation and other organizations,

e.g. Murray and Wood (2004). The following 2004 records were received of species seen in the wider LNHS recording area but not from within Greater London:

SILVER-STUDDED BLUE *Plebeius argus*. Small numbers were present at a site at Fairmile Common. Plant (1987) reported that in 1986 this location appeared to be the only remaining site for this species in the LNHS area. The 2004 records were from Stephen Spooner and Tony Quinn.

PURPLE EMPEROR *Apatura iris*. A male was observed on 13 July 2004 in the Broxbourne Wood area by Diane Andrews.

SILVER-WASHED FRITILLARY *Argynnis paphia*. Recorded at Bookham Common by Stephen Spooner where four were seen on 27 June 2004.

Discussion

There is evidence from the data that the brimstone butterfly is increasing at some sites within urban London. Though a 'wider countryside species' (Asher et al. 2001), the increase of the brimstone in urban London is possibly as a result of the planting of the main larval foodplants. Nationally, the brimstone is distributed throughout the southern two-thirds of England and within the range of the foodplants (Asher et al. 2001). Assuming that other aspects of the brimstone habitat in London are not inimical, it should be relatively easy to increase further the distribution and population size of this species in London.

Acknowledgements

Sadly, Valerie Carter who recorded at the Forty Hill transect, and John Whiteman who had been involved with several transects, have died. In 2004 the transect walkers were Bob Gillam, Aaron Beat, Adrian Brooker, Tom Williams, Phil Stead and Ian Shepherd at Hampstead Heath, Michael Berthoud, Simon Mercer, Tony Bennett and Leslie Williams at Fryent Country Park and Beane Hill, Ann Rix at Gutteridge Wood, at the Corporation of London sites on the southern edge of London (Coulsdon, Farthing Downs, Kenley Common, Riddlesdown, Riddlesdown Quarry, Farthing Downs New Hill, Happy Valley, West Wickham Common, and Spring Park) the team comprised Mike Enfield and colleagues, Diane Furley and Lorna Arnold at New Barnet Allotments, Martin Boyle at Mitcham Common, R.J. Bullock at WWT Wetland Centre at Barn Elms, David Bevan at Railway Fields, John Grayley at Cranford Park, Martin Wills at Hutchinson's Bank Nature Reserve and Chapel Bank, Malcolm Bridge at South Norwood Country Park, Robert Callf at Trent Country Park, Terry Lyle at Tower Hamlets Cemetery Park, Brian Prior at Gunnersbury Triangle, Paul Jeffery at Roxborough Rough, Andrew Self, Roy Beddard and Ian Ellis at the Brent Reservoir, Joan Lowe at Featherbed Lane Verge/The Gallops, C. Slack at Cranebank, Donald Rooum at Regent's Canal towpath, Colin Conroy at Minet Country Park and at Minet site BWB, and David Johnson at Regent's Park. Records were also received from some of the transect walkers listed above and from Neil Anderson, Diane Andrews, Brian Dawton, Grant Hazlehurst, Ron Kettle, Ian F. Pryer, Catherine Schmitt, Paul Sellers, Stephen J. Spooner, Jane Woodliff, and from London Natural History Society field meetings/LNHS *Newsletter*, and the Butterfly Conservation Hertfordshire and Middlesex Branch *Newsletter*. Landowners and land managers of the sites have an important role in undertaking habitat management and supporting monitoring. These include a significant number of the London boroughs (see the Methods), the Corporation of London, other public authorities, the London Wildlife Trust, the Mitcham Common Conservators, the Friends of Tower Hamlets Cemetery Park, Barn Hill Conservation Group and the Welsh Harp Conservation Group. The co-operation with the county co-ordinators for Butterfly Conservation is noted, particularly Mike Enfield (Surrey), and John Murray and Andrew Wood (Hertfordshire and Middlesex). Dr Dave Dawson advised on the statistical method for the collations and the programming of the spreadsheets. Simon Mercer helped develop the series of linked spreadsheets. I also thank Colin Plant, the Greater London Authority, the Millennium Awards, British Trust for Conservation Volunteers, and Caroline Williams.

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Book review

The lichen hunters. Oliver Gilbert. The Book Guild Ltd, Lewes, East Sussex. 2004. ix + 208 pp. Hardback. £16.95. ISBN 1 85776 930 9.

This is a remarkable book, unique in its scope and content. It provides an excellent history of British lichenology during the last half of the twentieth century, the most important event being the formation of the British Lichen Society in London in 1958. The author, Oliver Lathe Gilbert, was born in 1936 and joined in 1964, and the book details both the development of the Society and his own extensive lichen field studies up to 2001. He is essentially a lichen ecologist, and has a gift for writing enthusiastically about persons and events, despite having suffered an unfortunate divorce and then kidney failure from 1995. He laments that the heyday of the observer working from home is drawing to a close, but notes that there are now several lichen consultants who are able to earn their living from fieldwork, so all is by no means lost.

Much of the book is devoted to accounts of Oliver's attendance at field meetings, workshops, and expeditions to remote areas of the British Isles, as well as examinations of neglected habitats and days out, based on his log. He has already published the scientific results from these studies in the journal of the Society, *The Lichenologist*, and this book details how these results were obtained. The excursions to remote islands, such as St Kilda and North Rona, were quite dangerous, accompanied by sea sickness and accidents, whilst those to high mountains involved nights spent in soaking tents, vividly described, but compensated for by views of fine scenery and the finding of many lichens new to Britain. A snoring ghost was encountered on Steep Holm. Here Oliver was alone, but on most other expeditions he was accompanied by other distinguished lichenologists, especially Brian Fox (a widower, died 1999), Vince Giavarini, Alan Fryday, and Brian Coppins, their personalities being described in detail; evidently no women were considered good enough for this work, so unfortunately no romance took place! Persons on field meetings are divided by Oliver into four types: perpetual beginners, standard members, bloodhounds, and experts. Edited extracts from articles by Vanessa Winchester and Alan Fryday, previously published in *British Lichen Society Bulletin* **65** (1989) and **70** (1992) are also included, the wrong bulletin number being given for the first piece.

Lichen hunters have varied idiosyncrasies and these are described. Chris Hitch, for example, figures as a 'gentle, balding, bear of a man who never married, he has a touch of the leisured English gentleman about him as has never had a nine-to-five job, having spent most of his time working on the family smallholding. A creature of habit, who does most of his fieldwork on Tuesdays, . . .' Peter James is described as dominating British lichenology for thirty years, but presented as living in a bygone age. Arthur Chater is reported (p. 173) as being 85, when in fact he was 65 at the time of the airfield surveys. Peter James's rival for the position of lichenologist at the Natural History Museum in 1955 was not G. A. M. Scott, who was still a student at that time, but may have been G. D. Scott. The first assistant in the Lichen Section at the museum was Ian Tittley, not Totley, who later became an algologist and entrepreneur.

The book is illustrated with thirty-seven photographs, all but one in colour. These are mostly of lichenologists, often engaged in fieldwork. There is one photograph of a lichen. Unfortunately the illustrations are not referred to in either the text or the index. The author figures in at least eight, as well as on both covers of the dust jacket, surely a case of overkill. Ursula Duncan appears as a debutante, rather than the tough energetic cattle farmer that we knew and loved.

Although Oliver has written 'a social history of the British Lichen Society', there are important persons and events which have been omitted. Sir David Smith FRS, for example, does not appear, and Professor David Hawksworth's removal as director of the International Mycological Institute on 1 January 1998, and his subsequent flight from Britain, receive no mention. The international influence of the Society receives little comment, but is probably outside the scope of the book. Interesting asides (p. 175) include the ways of dealing with aggressive landowners when trespassing. At the end are listed six stages in a lichenologist's development. These apply to Oliver Gilbert, but not to all. And what is the future for the lichen hunters? Well, as Scarlett O'Hara remarked: 'tomorrow is another day'.

JACK RODNEY LAUNDON

Survey of Bookham Common

SIXTY-THIRD YEAR

Progress Report for 2004

General (Ian Menzies, Chairman, Bookham Common Survey)

The installation of our new Bookham Survey hut made a good start for 2004. On 5 January members of the LNHS Survey Team (Ken Page, Alan Prowse, Ian Menzies) and local National Trust staff (John Cranham, Ian Swinney) were present to witness its erection on a new site about thirty feet to the south of the old hut.

An official Open Day, held on Saturday 9 October, was enjoyed by around thirty-seven members and friends amongst whom it was good to see several younger members (Figure 1). Jan Hewlett, our president, gave an address in memory of Ruth Day after whom the hut has been named, and an appropriate plaque was installed. The abundance of refreshments and sparkling vintage contributed by the Society and individual members was much appreciated. Colour prints relating to birds and insects found on the Common were exhibited, and a short guided tour around the Isle of Wight Pond during a pleasant sunny afternoon made an agreeable conclusion. Altogether the occasion was considered a great success and we now have a sound hut of adequate size in addition to the continued goodwill of the National Trust to ensure that natural history at Bookham can continue to be appreciated, we all hope, for many more years.

History of the LNHS Bookham Survey hut. The first hut (14 × 10 ft) was installed in December 1964, during the twenty-third year of the Bookham Common Survey, coinciding with the building of a keeper's cottage (Merritt's Cottage) in the Isle of Wight enclosure and appointment of a National Trust keeper. Cyril Castell, chairman of the Survey at the time, commented 'the absence of a tea-place, of a lunch-place sheltered from the cold in winter and from rain in summer and somewhere for members to meet to plan and discuss operations and keep equipment, have all been keenly felt for years and may have contributed to the falling off of both numbers and enthusiasm in the survey team. The provision of the hut is both a challenge and an incentive to renewed enthusiasm and greater effort from the Ecology Section's Survey' (Castell 1965). Later this hut was named the Castell Research Centre in recognition of Cyril Castell's outstanding services to the Survey during twenty-six years of chairmanship (Beven 1969).

The second Bookham Survey hut (8 ft × 16 ft) was erected 1989, this time on a concrete base as the floor of first hut had become seriously damaged for lack of protection from damp (Beven 1988, 1990).

Installation of the present Survey hut (12 ft × 18 ft — almost twice the floor space) was considered advisable for a combination of reasons. Firstly, The National Trust had requested that the hut should be moved to a less intrusive

FIGURE 1. Members and friends of the London Natural History Society attending the opening of the Ruth Day Bookham Survey Hut, 9 September 2004.

Photo: Ian Swinney

position, secondly it had proved too small to accommodate all the members wishing to attend Saturday meetings when the weather was cold or wet and, lastly, it had suffered from storm damage yet to be repaired. The new hut has been largely financed by contributions made to the Ruth Day Memorial Fund, but the Society is grateful to The National Trust for providing a concrete foundation, arranging the transfer of electricity and water supply, and making several other fixtures, most of which has been expertly supervised, indeed mainly undertaken, by the warden, Ian Swinney.

As mentioned in the last annual Progress Report (Menzies 2004) access to the warden has become irregular largely because he has been required to work from Landbarn Farm, Westcott instead of Bookham during the previous eighteen months. As some unfortunate misjudgements of management had resulted it was decided to implement six-monthly field meetings between National Trust staff and members of the LNHS Survey team, to create a regular opportunity for the exchange of up-to-date information about key aspects of natural history, especially of issues that might relate to management. Three meetings, on 21 October 2003, 27 April and 21 October 2004, have now taken place. These have clearly met with approval, and are a practical means of exchanging recent information and getting the NT staff and LNHS members to know one another. One outcome has been a letter to The National Trust warden Ian Swinney in which Dr Alan Prowse discusses aspects of bird conservation at Bookham. Since this subject has a much wider area of interest and application a copy of the letter has been included at the end of the bird section of this report.

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Management tasks on the Bookham Commons, 2003 and 2004

(Ian Swinney, National Trust warden for the Commons)

In view of the number of reports and papers about Bookham submitted for publication in 2004 (i.e. report for 2003) it was decided that notes on the management could wait another year, so that the present report summarizes activity on the site during 2003 and 2004.

General. Due to health, safety and security considerations, along with the need for a more efficient use of shared equipment, the work yard at Bookham has been closed and wardens are now based near Dorking, at Landbarn Farm, Westcott. Still living in the middle of Bookham Common, my time here is limited, though we all work here as a team from time to time and have undertaken some very useful projects, such as the control of Himalayan balsam, more extensive bracken control and better presentation of the property. Mowing of verges and car park surrounds goes against the grain for wardens and naturalists alike, but if the property is left to look wild and overgrown it can lead to greater abuse of the countryside, especially from fly-tipping. Mowing performed on a rotational basis will help by allowing recolonization of species from adjacent uncut areas.

Grassland and scrub. I have for a long time recognized a need to distinguish scrub management from scrub clearance. After all, scrub is an important habitat, just as much as is open grassland. Put simply, the greatest variety of wildlife on the Commons can be found in the open grassland areas. This is where there is most sunlight which, together with soils ranging from alluvial deposits by the streams with quite a high pH, neutral London Clay and more acid sands or sandy clay, will support the greatest variety of plants and consequently insect species. This, in turn, relates to the survival of many species of breeding birds, but this is only fully realized when there is also sufficient shelter from nearby scrub and wood margins.

During the early 1990s aerial photographs and observation on the ground had enabled us to estimate that the area of grassland left on the plains had become reduced to 25 per cent, the remaining 75 per cent now being covered by young trees and scrub. As the remainder of the Commons consisted of fairly dense oak woodland, our stated aim for some parts of the plains (and part of our Countryside Stewardship Agreement) was to reverse these percentages over the next ten years. However, significant areas of scrub need to be retained as a valuable habitat for bird and insect life, and this presents a problem considering the dynamic nature of this vegetation. It grows old, falls over, and dies, or remains green at the very top and hollow at the bottom, enabling you to walk under it.

In order to maintain the continued presence of mature scrub (valuable for feeding and roosting birds, home to rare insects such as the hawthorn jewel beetle *Agrilus sinuatus,* besides many other insects) intermediate and young plants need to be encouraged. A broad age-range of scrub is required, the

young scrub providing nesting sites that are impenetrable to opportunist predators. Efforts to reverse the loss of species-rich, unimproved grassland — 98 per cent of which has been lost since 1945 largely due to changes in agricultural practice — should respect the importance of scrub as an environment which means that grazing or mowing must not be too severe, or replacement scrub cannot grow. It can be seen that problems may arise concerning protection of the relatively small grassland areas that remain.

The species composition of the scrub often depends on grazing, or lack of it. Most of the old scrub is thorn (hawthorn *Crataegus monogyna* and blackthorn *Prunus spinosa*) which is relatively slow-growing and offers good cover for nesting birds. We have cleared trees and over-mature scrub, hoping to get clumps of young impenetrable thorn, only to have the area colonized by birch and willow (sallow) which have a survival strategy based on rapid invasion of bare ground, fast growth and production of millions of seeds to enable further colonization. Grazing such areas with livestock prevents willow and birch becoming established, whereas thorns, whilst they do get eaten, are able to survive grazing pressure. When this pressure is released (e.g. non-availability of cattle and myxomatosis) the thorns soon predominate.

When all this is taken into account, careful rotational clearing of over-mature scrub, and particularly of young trees that would otherwise soon dominate the site, has been undertaken with the help of volunteers armed with bowsaws since 1949, and the deployment of a large excavator since 1989. The excavator can clear scrub very rapidly and for the first time ever we had to become very selective, regulating the areas worked and the amount cleared. Many young trees had to be removed as they presented a much greater and more permanent threat, changing these traditionally open grassland plains for ever. Careful operation of the excavator when clearing scrub species can reduce the damage done to the soil structure so that the dormant grassland seed-bank is released, with remarkably rapid recovery in the cleared ground. Removal of tree stumps requires deeper excavation, creating disturbance of the subsoil which can lead to rushes (*Juncus* spp.) dominating the vegetation. Stump removal has since been kept to a minimum.

Another example of what can go wrong concerns communication. During the winter of 2002/3 clearance of young oak, birch and aspen was carried out on Bayfield Plain. At this time another task was identified and shown to the contractor operating the excavator, as a task for future consideration. The blackthorn on Central Plain had encroached and collapsed leading to a narrowing and erosion of the main path from Bookham Station to Bayfield Plain. In the meantime, that spring, nightingales had occupied the blackthorn on either side of the footbridge nearby, requiring that thorn removal be postponed and limited appropriately. Unfortunately this information was not passed on to the contractor (who remembered, rather too well, the job as outlined during the winter) who became available, at short notice in August whilst your warden was on holiday! Welcomed to the site by a member of staff less familiar with the site, the removal of blackthorn achieved was rather too generous!

To avoid such misunderstandings taking place in future, twice-yearly tours of the Commons have been arranged and undertaken jointly by members of National Trust staff and of the Society's Bookham Commons Survey team.

Another area cleared of young trees by the excavator in 2003 was situated along the southern boundary of Bayfield Plain where some aspen was beginning to take over. Aspen can grow and spread aggressively, but as it is also an important foodplant some young suckers were purposely left. A rotation of young aspen will particularly suit *Zeugophora flavicollis*, a very rare Bookham leaf-beetle, besides many other insects that use aspen as a foodplant. Further clearing by the wardens, using power tools (chainsaws, clearing saws) was undertaken in the autumn of 2004.

Ponds and wetlands. Tree thinning at the Isle of Wight Pond in 2003 let in much-needed light to the pond margins and, coupled with the new sluice setting a slightly lower level that coincides with a gently sloping bank profile, there is a much-improved gradation from marsh to emergent plants at the pond margin. This part of the Common used to be much more open and cattle grazed (wood pasture), the evidence for this being seen in the vegetation as well as from old photographs. While considerable tree thinning needs to continue, our intention is to grow broad-crowned, open-grown oaks as eventual replacements for the older veteran oak trees.

Between the Lower Eastern and East Hollows Ponds is a very valuable wetland area that had become overgrown with willow and birch. This was cleared by volunteers on one of the National Trust's Working Holidays in the summer of 2004. Already there is a great increase in the ground flora which will in turn lead to an invasion of interesting invertebrates, already evident from Roger Booth's beetle report for 2004 (see p. 196).

Our local volunteers from 'Friends of Bookham Commons', assisted by Guildford National Trust Volunteers have made an excellent job of clearing around Bayfield Pond in the autumn of 2004, again letting in much-needed light.

Woodland. The greatest impact of management in the woodland areas during 2003/4 has been the reduction of sycamore from Hill House and Central Wood using contractors to fell trees in areas where they dominated the under storey. During this period 'chemical thinning' of the invasive turkey oak was carried out by our team of wardens. This technique of boring holes and injecting glyphosate has been developed to avoid damage to pedunculate oak struggling to grow alongside. Even very accurate felling would involve damage to the lateral branches of adjacent trees, especially if old and fragile, whilst this method means that only the dead turkey oaks near recognized paths would need to be felled for safety reasons.

A particularly satisfying task was to cut back and scallop the edges of the middle section of High Point Path in the autumn of 2003. Initially the hazel and holly were cleared from the path edges — which had crowded in to make the path less than six feet (2.0 m) wide in some places. Some of this brushwood was chipped and left as 'habitat piles', though this proved quite time consuming. A somewhat more rapid technique was to gather the felled branches with the fore-end loader on the tractor and make off with them to a suitable gap in the trees, where they can provide deadwood, shelter and a climbing frame for bramble. This was done on a larger scale in November 2003 with an excavator stacking the tops of felled turkey oak (easier to fell on path edges) and making giant habitat piles which will become extremely valuable when bramble-covered as a source of nectar for woodland insects, especially butterflies.

The whole section of path is recovering well and should look very attractive in a few years' time. Judging by the instant appearance of foxglove plants, like poppies they must have a very long-lived seed. There has been no time for these plants to have seeded into this area and, being biennial, 2005 will see a spectacular show of them in flower.

Further work, on a rotational basis, is planned along the main woodland rides while retaining a proportion of shaded, narrow footpaths to respect a need to preserve some of the characteristic dense oak woodland. We are grateful to Ken Willmott of Butterfly Conservation for his advice and expertise on the requirements of the purple emperor, white admiral and silver-washed fritillary butterflies, so that their needs are allowed for when working in the woodland areas. This task should be of great benefit to them.

When considering the management work on the Bookham Commons advice from and discussion with the London Natural History Society is always sought

and welcomed. I think that together we can be proud of supervising one of the best-recorded sites, of international repute, for nature conservation,.

Vegetation (Bryan Radcliffe)

It is undoubtedly true that the recording of plants in an area of substantial size never reaches finality. Three major surveys of the Common have been undertaken in the last sixty years (the last and most extensive ending only two years ago) but records continue to accumulate. The majority have been of previously known species in new divisions, or repetitions of species missed in the most recent survey. Somewhat more noteworthy are species that have never before been recorded, and we have had eight in the last two years. Discounting two on the assumption that they are casual garden cultivars we are left with the following:

Arctium minus ssp. *nemorosum*. Only one individual seen within the survey area proper, although another was noted in the Isle of Wight enclosure. This subspecies is clearly much less frequent than ssp. *minus*, although the genus as a whole has increased markedly in the last six years.

A *Thalictrum* in division M will certainly be new to our list but must await the production of flowers to provide a specific name.

The *Tilia* in division N which we believe to be *T. americana* also has to produce flowers to allow for reliable identification. The tree is in woodland and some limited clearance of adjacent young trees was undertaken this summer to try to ensure that proper development occurs.

We are indebted to our new member Steve Mellor for the discovery of *Veronica anagallis-aquatica* in the Isle of Wight Ditch. The plant seeded well and may spread in due course.

In view of its abundance in many parts of the London area, the humble wild carrot *Daucus carota* may cause some surprise when we point out that it was unknown on Bookham Common until 2003 when we found adjacent plants in division F.

The onset of winter accompanied by the fall of deciduous leaves allowed for the detection of mistletoe *Viscum album* on a hawthorn in division R. The maturity of the bunches indicated that it had been there for a long time, but until November 2004 we had never been in the right place at the right period. The species is frequent on various trees in Fetcham and Bookham Villages.

Our most recent survey produced depressing evidence of diminishing frequency or even total loss of previously scarce species. On the other hand a few species, at present of restricted distribution, may possibly be increasing. They include two natives, green houndstongue *Cynoglossum germanicum*, small sweetbriar *Rosa micrantha* and an alien, rum cherry *Prunus serotina*. The last named is from the USA, named by the early settlers for its use in flavouring rum drinks. It is naturalizing in southern England and Wales on acid soils, especially in Surrey. Headley Heath has had numerous trees for many years, while in 2003 five youngish individuals were noted on Redhill Common.

With the possible exception of a botanical purist, rum cherry is likely to be regarded as a welcome acquisition to the flora. It has attractive flower spikes, dark cherries much beloved by birds, and handsome autumn colour.

Birds (Alan D. Prowse)

The highlight of the year in rare bird terms was a white stork, a first record for the Common. On 1 April at 4.25 p.m., CP saw the bird flying over his house in Little Bookham, and drifting off — over the railway/southern edge of the Common. It was an extremely well-documented bird, previously seen near Chertsey earlier in the afternoon, reported by the *Leatherhead Advertiser* as having settled in Mill Pond Field, Fetcham for an hour, then crossing the M25 at 6.30 p.m.!

The year started less auspiciously with a ring-necked parakeet on 12 January flying over Central Plain. On 10 February six (seemingly three pairs) were over South Wood in aerial evolutions, with other records occasionally during the rest of the year; the only previous record was in 1991, but it looks as though this aggressive competitor for nest holes has spread to our area. The species has nested in Fetcham and Bookham in the past few years. A grey wagtail in January continued the run of recent years, as did snipe, with a maximum of ten on 25 February. A gadwall on 21 January was our second record, the previous record being in May 1971. The Common has been one of the few reliable places to find winter hawfinches. One or two were seen from 12 January to 4 February on Central Plain with a flock of ten on 2 February (ADP). A woodcock was on Eastern Plain on or about 30 March (LG), and a wheatear on Central Plain (CP) on 17 April was the first since 1996.

There was only one starling record during the year, of ten birds at Hundred Pound Bridge on 29 May. On 16 July two kingfishers were at the main ponds. There were no records of house sparrows, pied wagtails or reed buntings in the year.

In the autumn ten teal on Pond 2 on 8 October equalled the highest previous record. The only recorded mandarins were later in the year with a maximum of four on 8 October and 23 December. A juvenile hobby flew west over IoW Pond on 9 October (ADP). It was a good year for winter thrushes, with good numbers of redwing and fieldfares on the plains in early winter. It seems not to have been previously recorded that redwings occur throughout each winter in the woodland itself, in small parties feeding in the leaf litter. A large roost of redwings developed in the tall ivy-covered oaks near Tunnel car park with birds coming in frequent small parties from mid afternoon, and this roost continued throughout the winter.

Breeding season studies. Little grebes nested on Ponds 1, 2 and 3, young being recorded on P2 on 16 July, and P3 on 21 June. Coot nested on Ponds 1, 2 and 3. Moorhen were on the ponds and along the streams throughout the year, with a high count of twenty-two on Isle of Wight Pond on 8 October, which was a welcome reassurance that we have no problems with mink at present.

There were twenty-five heron nests, fourteen of which are known to have been successful (RS). For the first time since 1943, two pairs of sparrowhawks are known to have nested (LG and A and AS), about a kilometre apart. One nest, fourteen metres up on a side branch in a twenty-seven-metre oak, had five young — three females and two males — and young were heard in the other area. Two pairs of buzzards were in the immediate area of the Common from February to July, though there was no evidence of successful breeding.

At least five territories of stock doves were known, and a similar number of collared dove territories peripherally. There were no turtle dove records. Cuckoos were present on the main plains and Eastern Plain area from 16 April to 5 June. A pair of lesser spotted woodpeckers was present in the recent breeding area, and the species was heard in one other area. Both swallows and house martins nested at the western edge of Banks Path, with a further population of each on Chasemore Farm.

The first nightingale appeared on 19 April, and there were 5 territories. The warbler survey on the plains produced the following numbers of territories: lesser whitethroat 5; whitethroat 28, with 2 territories elsewhere; garden warbler 21; blackcap 28; chiffchaff 33; willow warbler a disappointing 3. Song thrush territories totalled 10 on the plains. Among the finches on the plains the chaffinch had 22 territories, bullfinch 8, and the greenfinch and goldfinch increased to 4 territories each, but linnets were recorded only in the roadside hedges on Chasemore Farm. Lesser redpolls have long since stopped breeding on the Common but one was recorded on 13 April (CP). Our only bunting was a territory of yellowhammer on the adjacent Chasemore Farm, which just encroaches on the Common at Hundred Pound Bridge.

Other breeding season records included five known goldcrest territories, eight long-tailed tit territories, and fourteen known marsh tit territories, without a survey being done on this increasingly uncommon species. Campbell and Ferguson-Lees (1972) state that treecreepers occasionally have second broods. Singing males in two different areas on 26 and 28 May suggest this may have happened — I have not recorded such late singing in the past.

Further observations. Since I started observations at Bookham in 1996, I have worked mainly on the plains, which were undergoing major changes in essential scrub clearance. The plains had been largely overlooked in the previous two decades. These observations are allowing comparisons between the plains as they have been recently, and the surveys by W. D. Melluish starting in the 1950s (Melluish (1960) and subsequent Bookham Common reports).

In the period 1996–2004 there have been changes. The woodcock is no longer seen roding. Among birds of conservation concern we have lost turtle dove, reed bunting and grasshopper warbler. Nightingales have dropped from a peak of twelve pairs to their present five. The pied wagtail no longer seems to breed, the starling no longer nests in the tree holes, and is seen in very small numbers only occasionally. The house sparrow has a few individuals only by the local hotel. Bullfinches are decreasing as more scrub is cleared, though we have still a moderate population of this declining species.

There are, however, some increases. Greenfinches have returned to breed regularly, as have goldfinches. Collared doves are more widely distributed locally than they were. It is unfortunate that the ring-necked parakeet is now seen and heard regularly over and around the Common throughout the year. Lesser whitethroats now regularly nest, and in larger numbers than before, though threatened by the level of scrub clearances. Swallows and house martins have become regular breeders in the last couple of years. Buzzards are now regular in the area, with some displays seen over our woodland. Two pairs of sparrowhawks equals the record for 1943.

The high densities of some woodland species call for renewed study, so intense study of the plains will be discontinued. The start will be made in 2005 by joining the two-year survey by the BTO of scarcer woodland birds, possibly to be continued on the Common annually thereafter.

Acknowledgements

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Bird conservation at Bookham (Alan D. Prowse)

Letter to Ian Swinney, National Trust warden for the Bookham Commons, 18 January 2005:

Dear Ian,

When talking last week I mentioned useful charts in Rob Fuller's book on the birds of forest and woodland. I have copied a few of those as they would interest you.

We were also talking about conservation on the Common. I have been thinking about this since, especially when you said that the really thick thicket by the houses at the junction of Bayfield/IoW Plains needed attention. To me, most of the areas of dense thicket have been cleared or thinned, and the few

remnants are of increasing importance. My concern is this. If we make the plains more uniform, the special habitats disappear. The Common gets better for generalists like the **robin**, **chaffinch**, **wren** and **blackbird**, and we lose the species which have more specific requirements. Most of the time we do not have sufficient knowledge to say what those specific requirements are, so we have to take note of what there is, and take action, or no action, as the case may be.

In the past decade various official bodies have got together to publish a list, *The Birds of Conservation Concern*, which was last revised about two years ago. The parts of the list are the *Red List* — birds which have lost 50 per cent of their numbers or more, and the *Amber List* — birds which have lost 25–50 per cent of their numbers. I think it will be helpful to you if I detail the status of those at Bookham at the present time, so we know where to focus our interest.

Red List

The **skylark** and **linnet** are of no particular concern. The **grasshopper warbler** and the **willow tit** have been reduced nationally, and are not affected by our conservation. The **starling** and **house sparrow** are, once again, not relevant to what we do. The two **buntings**, the **reed** and the **yellowhammer**, were in some numbers on the plains years ago, but are now uncommon nationally. We held on to a couple of pairs of **reed bunting** into the late nineties, and a **yellowhammer** is on Chasemore Farm and our northern border, dependent on Chasemore.

The species that concern us are the **turtle dove**, **lesser spotted woodpecker**, **song thrush**, **marsh tit** and, especially, the **bullfinch**.

Turtle dove. Confined to the plains. The numbers were just in double figures in the late 1990s. In the past two years there have been virtually no contacts, though each year one or two are seen or heard. Their strength was on IoW and Western Plains. There were also a few in the Banks Common region. They will use scattered large thorns, but prefer thickets, but my observations in various places indicate they must have an upper storey such as telephone wires or dead trees to perch, sing and court on. We badly need to provide such help in case we can keep the remnant population of a bird which is rapidly decreasing in this country. They feed up to five km from the breeding site so are not dependent on us for food.

Lesser-spotted woodpecker. Now rare. We have a few pairs (four in 2003) — one in Bayfield Pond area, one at the Arboretum and Eastern Plain, one on south-east border of SE Wood, and one in the south-eastern corner of the eastern edge of the Common. They tend to like orchard conditions, and they benefit from the conservation we are doing, needing rotten wood, and, on Bookham, they seem more associated with birch than anything else.

Song thrush. Has suffered severe declines because of modern farming. Declined on the common, but now seems to be holding its own and, I think, in numbers not unlike the 1970s. Always less common than the blackbird, we have moderate numbers both in the woodland and on the plains. Probably not sensitive to our conservation methods, and benefiting from our absence of molluscicides, insecticides, etc.

Marsh tit. Severe decline. There seem to be fewer and fewer reported in the Surrey and London areas, though odd pairs here and there are not unusual in my experience. In Bookham we have a healthy population. Without a survey, I knew of seventeen pairs in 2003. They winter in their territories so we have them all the year round, and need a population which is self supporting. We seem to have achieved this, and it is one of the highlights of our birds.

[**Willow tit.** A close relative of the **marsh tit**, this has declined very severely in the South-East. It formerly bred in the woodland, and up to three pairs in the CBC area, though always scarcer than the **marsh tit**. Extinct as a breeding species on the Common now, though a pair was seen in the breeding season once about three years ago, and I had an unmated male singing for a few weeks on Western Plain within the past two years. Nothing we can do about it.]

Bullfinch. One of the highlights of the Common. It was abundant in the country a couple of decades ago, being shot as a pest in the orchards of Kent, but is now very local. We have some in the woodland where there is a bushy understorey, but their strength is on the plains. They need fairly dense thorny scrub. They were common on Central Plain several years ago but the two years' clearances have reduced them. We still have them in the scrub of Western Plain, but one of their strongholds is in that thick scrub on the western edge of the Bayfield/IoW border. Unlike the **chaffinch** and **greenfinch** they do not have strict breeding territories, so they tend to occur in clumps, travelling elsewhere to feed. We need to keep these clumps now we have reduced them on the plains. An additional point here is our small population of **lesser whitethroats**, which have built up in the last five years from occasional breeding to about four pairs. They also use thick scrub, and my comments on the bullfinches would apply to the same clumps for this species, which we have now lost from Central/Bayfield Plains.

Amber List

The **kestrel** has a pair sharing our southern part with Little Bookham, with another pair on Chasemore Farm, much the same as the last fifty years. The **green woodpecker** likes our woodland, plains, and the surrounding countryside. The **dunnock** is in trouble only on modern farmland, and the **willow warbler** has great troubles in its African winter quarters, so none of these concern our conservation. There is nothing we can do about the **cuckoo**'s national decline. The **swallow** and **house martin** nest on the houses at the western edge of Banks Path, and Chasemore Farm. The **mistle thrush** and **hawfinch** are present, and not really dependant on what we do.

Woodcock. Formerly present in Eastern Wood, and was roding on the Common still in the late 1990s. One report only of roding about four years ago, but I could not find any in the National Survey two years ago. My experience of them is that they do not like a completely closed canopy, and I think this is why they left the CBC area in the mid 1970s. I like to think the turkey oak programme will open the canopy in the central woodland and get them back if the programme is extensive enough.

Stock dove. Vast national decline in the DDT era, and still down. We have had them back for some years, dependant on hole-nesting in trees. No action needed though I do not know what effect the **ring-necked parakeet** would have on hole competition if it invades (though that applies to other species too).

Nightingale. You are aware of the nightingale areas. The upper part of Western Plain is still the stronghold. The western edge of IoW Plain had its first pair for some years in 2004, and this is a delightful glade with light woodland. The northern part of Central Plain has had a pair intermittently in the past few years and we should be careful here. The three pairs further down Central Plain have been reduced to one. You were commenting on the ugly open scar from the clearance near the bridge — perhaps a softening of this by layering some of the branches outwards would fill in this edge and restore some of that habitat a bit. We commented that some of the blackthorn scrub by

the new marsh on southern Bayfield Plain could give some future nightingale habitat. This species is severely nationally threatened, and our population will have to be self-sustaining to keep them.

I enclose a map of the plains with some comments on what I think are important areas from the bird point of view. I hope it is helpful.

Kind regards, etc.

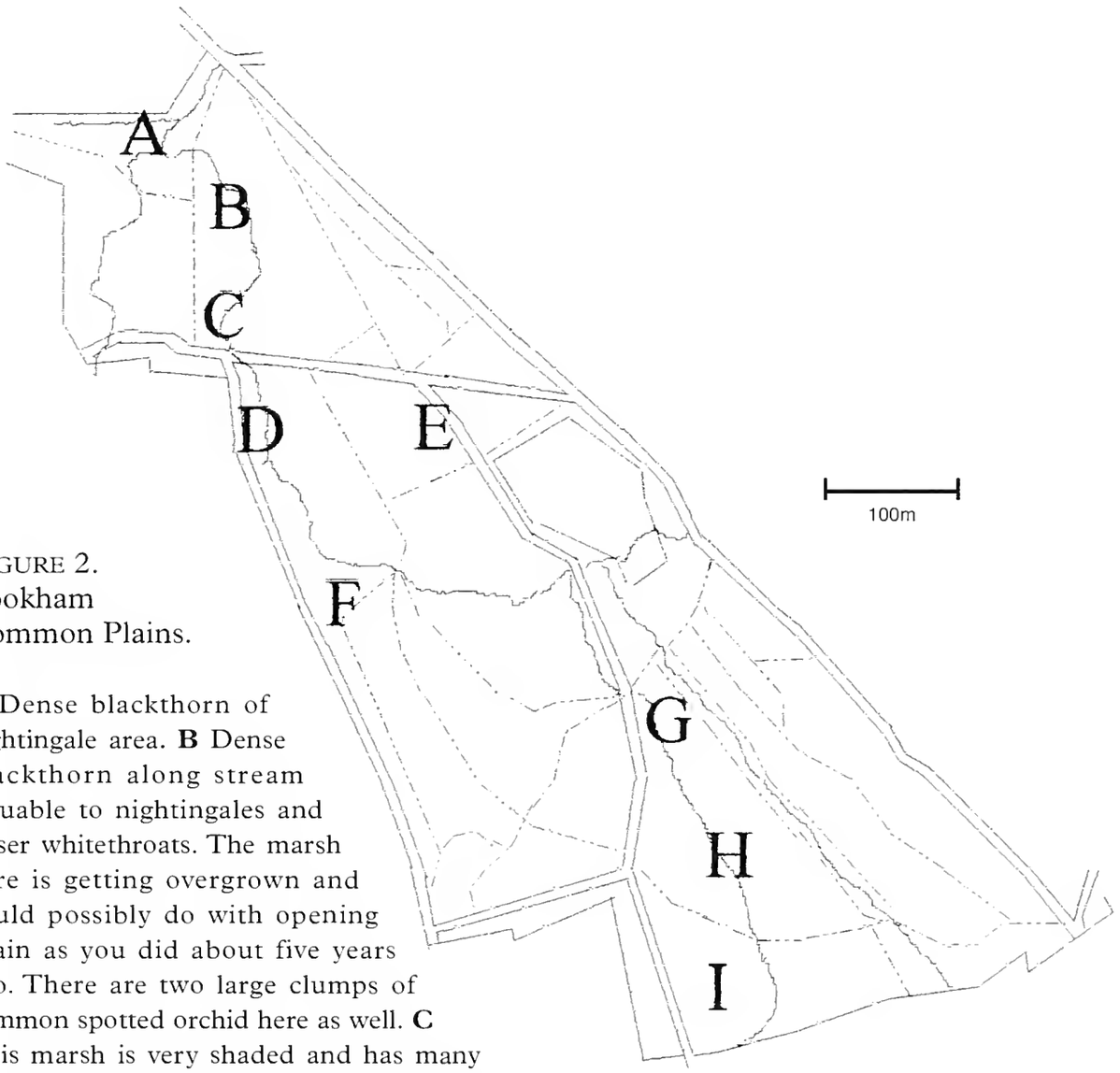

FIGURE 2.
Bookham
Common Plains.

A Dense blackthorn of nightingale area. **B** Dense blackthorn along stream valuable to nightingales and lesser whitethroats. The marsh here is getting overgrown and could possibly do with opening again as you did about five years ago. There are two large clumps of common spotted orchid here as well. **C** This marsh is very shaded and has many trees. Could it be opened up? **D** Your opening up of this glade is bearing fruit — a delightful place. A nightingale returned here in 2004 in the light woodland near the road over the stream. **E** The scrub along the road, between the light woodland and the cleared area is now holding many species. The rest of that cleared area is a disappointment, and the opened up blackthorn has never closed. **F** This dense blackthorn is needed by bullfinches and lesser whitethroats as well as other warblers. **G** Nightingales and bullfinches use this scrub. **H** One nightingale stayed faithful to this in 2004. As you suggested, the open scarred blackthorn at the bridge end could do with softening, perhaps by layering, to close it in and get regeneration. **I** I would love to see some of the blackthorn on the edge of the new marsh laid or flattened.

Mammals (Alison Fure)

The mammal boxes have been used throughout the year by many different species of invertebrate, bird and mouse including:

- fifteen wood mice (winter nests), with shrew evidence in one
- nineteen pairs of blue tits
- two night roosts, possibly wren judging by the large numbers of droppings
- Spiders, beetles, millipedes, snails and large numbers of noctuid moths

There were at least two *shifts* in occupancy in >50 per cent of the boxes. Only four boxes used by blue tits were not used again in the year. Four boxes used by wood mice had not been used earlier in the year. Five were used solely by invertebrates and a further five not used by anything at all.

Many boxes contained winter nests of wood mouse including loose leaves and caches of food: anything from seeds of hemlock and burdock to whole acorns. Some have been used solely as night roosts by birds such as wren (which may mean more than one bird using the box at a time). One item found in a box was not the start of a wasp's nest as first thought but a vegetative fragment of a gall (robin's pincushion or ragged robin) brought in by a bird in order to eat the grubs in private.

Some of this occupancy could prohibit use by dormouse so the key is to make sure that when one inhabitant has finished their winter/summer nesting/roosting, to clean it out for future occupants. The only positive recent sighting of a dormouse has been made by a contractor removing blackthorn during February 2005 on Central Plain (no hazel coppice in sight). It was found in torpor on the ground but scuffled away when exposed by scrub removal.

During summer 2004, note was made of a dead shrew on the path in Stents Wood, a weasel running across the road by the M25 bridge and another by Hundred Pound Bridge, also a general increase in fox sightings and badger activity. There are no hedgehog records to date and I would be grateful for any local information of this species. Llamas are being kept in a field adjacent to Great Mornshill Wood which will surprise anyone continuing along Banks Path. Could they be the next escaped non-native colonizers to the area?

During February a joint walk with the Bookham Mammal Group and Surrey Amphibian and Reptile Group (SARG) was undertaken to clean out some of the boxes, replace a few which had been under repair, and exchange information about the Common. On this occasion Ian Menzies discovered a harvest mouse nest in Hundred Pound Wood (an area clear-felled of poplar in 2002 which, as revealed by the 2003 mammal-trapping study, is particularly productive for mice and also the location of a tawny owl feeding area near the footpath to Chasemoor Farm). In addition, three boxes were found to contain wood mouse (a non-breeding pair which have remained there until the time of writing in May 2005) and small *tail run* marks under the bridge may have been signs of water shrew. On this trip one of the SARG members confirmed intermittent local sightings of brown hare.

A rabbit's 'stop' (natal den) was found later on the edge of Geat Mornshill Wood. The nest material comprised mainly grass lined with maternal fur (Figure 3). It had been dug out by a fox or stoat. The piles of snail shells around the warrens on Banks Plain testify to the omnivory of this species. At first sight it looks as if the Bookham song thrushes have a communal anvil but this coney delicacy has been well documented in Irish research.

A number of dead squirrels found shot and hanging in trees in Kelsey's Wood prompted a discussion with National Trust wardens in April during a subsequent 'exchange of information' walk. Apparently squirrel control had been discontinued in 1992 and the more recently observed cullings amount to poaching and should be reported to the wardens or police. To be legal control of so-called pest species must be authorized by the landowner. In any event it is unacceptable to leave corpses hanging from the trees.

During this walk, whilst pausing to look at a large patch of ramsons identified on IoW Plain by Ken Page, note was made of mammal holes along the brook with egress marks clearly leading straight into the water course. We only have anecdotal and historical records of water vole and no positive recent sightings and this may be an area to study in the future.

In 2005 it is hoped to undertake more bat surveys and volunteers are needed. We want to investigate the area around Kelsey's Pond which is not as

FIGURE 3. Nest of rabbit dug out from natal den at edge of Great Mornshill Wood by a fox or stoat. March 2005. *Photo: Alison Fure*

easily accessible as areas already surveyed such as the Isle of Wight Ponds and Hundred Pound Car Park and Woods. Unfortunately we missed an opportunity when the car park bridge was repaired by not making representations to the local highways authority to have bat bricks installed underneath the bridge for species such as Daubenton's which have an affinity for water.

Dragonflies and other insects Field Study Day, 10 July 2004

(Neil Anderson)

A group of ten members assembled for this now annual event to examine the entomology and general natural history of the Common. The weather was unsettled: sunny spells with heavy thundery downpours midday onwards, with a maximum temperature of 19°C.

Only ten species of butterfly were noted, less than would be expected. Most numerous was the meadow brown *Maniola jurtina*, seen in most open grassy areas with small numbers of the ringlet *Aphantopus hyperantus*. A female red admiral *Vanessa atalanta* was observed ovipositing on the underside of a nettle *Urtica dioica* leaf. Of the more specialized species we were fortunate to see about fifteen silver-washed fritillaries *Argynnis paphia*, a couple of which gave us prolonged views as they nectared on bramble *Rubus fruticosus* flowers. Two white admirals *Limenitis camilla* were noted, a female ovipositing on a shaded piece of honeysuckle *Lonicera periclymenum*.

Regarding moths, an adult silver Y *Autographa gamma* was seen, also the distinctive larvae of both the knotgrass *Acronicta rumicis*, on *Cirsium*, and of the cinnabar *Tyria jacobaeae*, on *Senecio*.

Odonata populations appear to have been suppressed — perhaps attributable to the recent unsettled weather conditions with torrential downpours. On the Isle of Wight Pond up to three male emperors *Anax imperator* were seen

patrolling. Three black-tailed skimmers *Orthetrum cancellatum* were noted basking on bare substrate and undertaking sorties. Also observed here were a female broad-bodied chaser *Libellula depressa*, a female common darter *Sympetrum striolatum*, 10+ common blue damselflies *Enallagma cyathigerum*, a couple of emerald damselflies *Lestes sponsa* and a solitary blue-tailed damselfly *Ischnura elegans*. Unfortunately deteriorating weather conditions prevented examination of the other ponds.

Good numbers of nymphs of dark bush-cricket *Pholidoptera griseoaptera* were found as well as a few of the long-winged conehead *Conocephalus discolor*. Adults of Roesel's bush-cricket *Metrioptera roeselii*, and a single speckled bush-cricket *Leptophyes punctatissima* were also seen.

Coleoptera recorded included the two soldier beetles, *Rhagonycha fulva* and *Cantharis bicolor*, a couple of longhorns *Strangalia maculata* on *Heracleum* flowers and a female *Oedemera nobilis*, four *Chrysolina polita* on *Mentha aquatica*, three *Phyllobrotica quadrimaculata* feeding on *Scutellaria* whilst some larvae of the green tortoise beetle *Cassida viridis* were found on *Mentha* leaves.

Several squash bugs *Coreus marginatus* were discovered, mostly inhabiting *Rumex*. New for me was a nymph of the woundwort shield bug *Eysarcoris fabricii*.

Given the recent hyped-up headlines in the media of a mass hoverfly invasion, it was no surprise to see large numbers of the easily identified *Episyrphus balteatus*. *Leucozona lucorum* and a copulating pair of *Sphaerophoria* sp. were also observed. A single hornet *Vespa crabro* was seen by a dead oak branch.

On the spider front, a large brood of *Pisaura mirabilis* was seen in their cocoon, whilst mother guarded on a leaf below.

I am indebted to Dr Alan Prowse for providing Odonata data for the site through the season. Most notable was the arrival of the small red-eyed damselfly *Erythromma viridulum*, on the Common, recorded by Alan on IoW Pond, 22 August. This species has undergone a phenomenal colonization, originating at three sites around Bradwell, Essex, in 1999. Aided by fresh immigration, this dynamic addition to our insect fauna has now been recorded at over a hundred sites with proven breeding at some. The species favours ponds and lakes with an abundance of submerged pondweeds which are important for the feeding nymphs. Work by Steve Chan in Bedfordshire has shown that emergence usually occurs on plant stems in the middle of water bodies, so searching for exuviae along banks tends not to yield results!

Another unusual, but not unprecedented, record for Bookham was the beautiful demoiselle *Calopteryx virgo* on the Central Stream — hardly a typical habitat as the species favours fast-flowing streams with pebble or sandy substrate. The nearest resident site I know of is the stream on Thursley Common.

A female common darter *Sympetrum striolatum*, was recorded at the early date of 21 June on IoW Pond. Alan surprisingly recorded no blue-tailed damselflies *I. elegans* this year, though we saw one on the study day, and he also noted a paucity of southern hawkers *Aeshna cyanea*, which were plentiful in 2003.

Butterflies: field notes for 2004 (Alan D. Prowse and Ian Menzies)

13.iii.2004: Tony Allen observed a great tit chasing a brimstone *Gonepteryx rhamni*.

14.iv.2004: peacock *Nymphalis io*, brimstone, and orange tip *Anthocharis cardamines* were seen on Western Plain and small tortoiseshell *Aglais urticae* and comma *Polgonia c-album* on Bayfield Plain (ADP).

16.iv.2004: a sunny day: IM records fourteen sightings for peacock butterfly, fourteen for brimstone, two for comma (by Arboretum only), eight for small

tortoiseshell (Bayfield Plain only), three for holly blue *Celastrina argiolus* and a single male orange tip by Central Ditch. On the same day ADP also records sightings of orange tip, small tortoiseshell and peacock on Western and Central Plains, and Tunnel Car Park, and in addition saw a red admiral *Vanessa atalanta*.

17.iv.2004: broken cloud with sunny periods and a cool wind: single sightings of comma and small tortoiseshell near Merritt's Cottage (IM).

22.iv.2004: orange tip, brimstone and peacock seen (ADP).

24.iv.2004: comma seen on Central Plain (ADP).

27.iv.2004: orange tip plentiful (seven seen on Bayfield Plain). A holly blue was seen near Merritt's Cottage, a few whites — probably green-veined *Pieris napi*. A single grizzled skipper *Pyrgus malvae* was watched by wardens and members during their spring 'exchange of information' walk on IoW Plain near the gate to Banks Path. Although the grizzled skipper was formerly common at Bookham (Wheeler 1955) it has been seen on very few occasions during the last twenty years (Wheeler 1989, Menzies 1991, 1993, Willmott 1997, 1998).

10.v.2004: orange tip, green-veined white and brimstone still quite plentiful on the plains (IM).

16.v.2004: two sightings of brimstone, six of orange tip, and a single of comma and speckled wood *Pararge aegeria*. One small copper *Lycaena phlaeas* was seen on Central Plain. Five eggs of brimstone (one just hatched) were found by searching the leaves of alder buckthorn on Eastern Plain, but no larvae of the purple hairstreak could be obtained by beating the oaks, though usually quite frequent at this time of the year (IM).

17.v.2004: three sightings of brimstone, two of comma, ten of green-veined white, three of speckled wood and a few orange tips and peacocks. One half-grown purple hairstreak larva was at last found by beating oak (IM).

12.vi.2004: a single sighting of common blue by Central Ditch, eight of speckled wood, two of large skipper and one of meadow brown on Eastern Plain (IM).

21.vi.2004: ringlet *Aphantopus hyperantus* seen near Merritt's Cottage (ADP).

26.vi.2004: three sightings of white admiral *Limenitis camilla* (two were also seen recently by Ian Swinney), many of freshly emerged ringlet, a few meadow browns and a single purple emperor *Apatura iris* (IM).

29.vi.2004: meadow brown *Maniola jurtina*, and ringlet both plentiful on the plains; one red admiral and two white admirals were seen in the woodland, and comma, small tortoiseshell and two large skippers *Ochlodes venata* seen on Central Plain (ADP).

6.vii.2004: ten sightings of white admiral, twenty three of silver-washed fritillary *Argynnis paphia*, both large and small skippers, ringlets and meadow browns plentiful, but no sightings of the purple emperor (IM).

10.vii.2004: about twenty sightings of silver-washed fritillary, but less than ten of white admiral, only three of comma and none of the purple emperor during the course of about two hours (see 'Dragonflies and other insects Field Study Day' report by Neil Anderson).

16.vii.2004: ringlets, gatekeepers *Pyronia tithonus* and meadow browns plentiful; holly blues were seen at Hundred Pound Bridge and on Central Plain, small skipper *Thymelicus sylvestris* — large hatches on IoW and Western Plains and grass verge near Hundred Pound Bridge, and small tortoiseshell seen on Central Plain (ADP).

18.vii.2004: a rather overcast afternoon: fifteen sightings of silver-washed fritillary, four of white admiral but none of purple emperor (IM).

19.vii.2004: a fine sunny morning: forty-three sightings of silver-washed fritillary (!), fourteen of white admiral, six of comma, a single sighting of peacock, and a few of red admiral during the course of about one hour, but again none of the purple emperor. Surprisingly the purple hairstreak was plentiful despite scarcity of larvae on oak during May (IM).

27.vii.2004: very hot and humid: still many silver-washed fritillaries flying, some worn but about 30 per cent quite fresh. No white admirals of purple emperors seen. Gatekeeper (= hedge brown) *Maniola tithonus* has now become plentiful on the plains and along woodland rides and margins (IM).

14.viii.2004: a fine day: about eight small coppers, and three rather worn silver-washed fritillaries sighted (IM).

28.viii.2004: single small copper and holly blue visiting flowers of water mint at margin of IoW Pond, three speckled woods seen (IM).

29.viii.2004: a male common blue *Polyommatus icarus* on Central Plain and a painted lady *Vanessa cardui* by IoW Pond (ADP).

Conclusions. Butterfly counts vary considerably according to weather conditions. However, making allowance for this it does seem that the numbers of white admiral and especially of purple emperor seen during June and July 2004 were low compared with recent years. Silver-washed fritillary numbers, by contrast, have been well maintained. It is reassuring to find that the grizzled skipper is still hanging on.

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Beetles 1: new beetles for Bookham during 2004 (Roger Booth)

The year proved to be busy for beetle recording on the Common, with monthly visits to service underground pitfall traps as well as several other visits. The following eleven species were recorded from the Common for the first time.

Sieving leaves at the base of a large oak growing next to East Hollows Pond produced *Atheta deformis* (Kraatz) and *Atheta parca* Mulsant & Rey (= *A. nannion* Joy), Nationally Notable and RDB K Staphylinidae respectively, on 21.ii.2004 with further examples of the latter on 13.iii.2004 and 10.iv.2004. *Myllaena gracilis* (Matthews) (Staphylinidae) was also found by sieving leaves etc. at the edge of East Hollows Pond on 10.iv.2004. Sieving the contents of an old magpie's nest by the Upper Eastern Pond on 13.iii.2004 produced, among other beetles, examples of *Leptinus testaceus* Müller (Leiodidae, but formerly Leptinidae), a species more usually found in small mammal nests. Water netting revealed the aquatic *Anacaena bipustulata* (Marsham) (Hydrophilidae), a Notable B species, in the Isle of Wight Pond on 10.iv.2004 and in the Lower Eastern Pond on 8.v.2004. The underground pitfall traps produced some unusual species during the year with two new to the Common: *Lathrobium pallidum* von Nordmann (Staphylinidae), an RDB K species, in a trap at the base of an old oak along the Hollows Path 10.vii.–1.viii.2004, and *Atheta*

gilvicollis Scheerpeltz (Staphylinidae), a poorly known species in Britain, in a trap at the base of an old oak at the side of Common Road in the South-Eastern Wood, 9.x.–12.xi.2004. A fresh bonfire site in the recently cleared area between East Hollows and Lower Eastern Ponds looked a very tempting site to search on 11.ix.2004 and several small species were collected among the wood cinders and charred logs. It was only after careful study at home that the enormity of the day's captures was realized with no less than four species new to the Common. While *Atheta luridipennis* (Mannerheim) (Staphylinidae) is a reasonably common species, *Atomaria strandi* Johnson (Cryptophagidae) is Nationally Notable, *Atheta fussi* Bernhauer (Staphylinidae) has RDB K status and *Corticaria fagi* Wollaston (Latridiidae) has RDB I status and was a new county record for Surrey. Finally, sieving the contents of a squirrel's drey on 11.xii.2004, a single specimen of *Sericoderus* (Corylophidae) was retained as a voucher. Upon dissection under the microscope it turned out to be a male and therefore unlikely to be an example of the common British *Sericoderus lateralis* (Gyllenhal) which is a parthenogenetic species. It seems likely to be one of the Antipodean species but has yet to be identified for certain.

Beetles 2: additional field notes for 2004 (Ian Menzies)

10.v.2004: the reed beetle *Donacia simplex* was seen on *Sparganium erectum* by Common Stream on Bayfield Plain, and about twenty-five larvae of the stag beetle *Lucanus cervus* were discovered by Ian Swinney when moving a large pile of dead wood and sawdust from the IoW enclosure to a new site by Glade Path (TQ125 564).

13.v.2004: a single may bug *Melolontha melolontha* was beaten from hawthorn, *Donacia simplex* a copper-coloured reed beetle on *Sparganium,* the brilliant metallic leaf beetle *Gastrophysa viridula* (many pairing) was plentiful on dock and also the tortoise beetle *Cassida viridis* on water mint, by IoW Pond. The only longicorn beetle found by beating hawthorn was a single *Grammoptera ruficornis* although the blossom was at its best.

16.v.2004: beating hawthorn blossom produced only one *Grammoptera ruficornis*, and two red-headed cardinal beetles *Pyrochroa serraticornis*, reinforcing the impression that this is 'a very poor year for most things so far', as both these species are usually plentiful at this time of year.

17.v.2004: several of the attractive longhorn *Anaglyptus mysticus* were beaten from hawthorn blossom along Common Road West.

12.vi.2004: A well-attended pond-dipping Field Study Day led by Eric Groves. Besides a range of aquatic invertebrates a strong colony of *Donacia simplex* on *Sparganium*, and two leaf beetles *Chrysolina polita* were found on *Mentha aquatica* at the margin of South Eastern Pond. *Gastrophysa viridula* was found on dock by Hollows Path and a single *Donacia vulgaris* on *Typha* by Lower Eastern Pond.

26.vi.2004: Botany of Bookham Common Field Study Day led by Ken Page and Bryan Radcliffe. Larvae of *Gastrophysa viridula* found on dock, IoW Plain.

6.vii.2004: several longhorn beetles *Strangalia maculata* were visiting bramble blossom, also the leaf beetles *Phyllobrotica quadrimaculata* (one), *Chrysolina menthastri* (one on *Mentha*), *Chrysolina polita* (plentiful on *Mentha*), and *Gastrophysa viridula* (abundant on dock) were found at the margin of IoW Pond.

18.vii.2004: leaf beetles *Chrysolina menthastri* and *C. polita* were present in increasing numbers by IoW Pond.

27.vii.2004: one hawthorn jewel-beetle *Agrilus sinuatus* was beaten from an old hawthorn near the Bookham Stream Crossing, Central Plain.

23.viii.2004: three of the brilliant green leaf-beetles *Chrysolina menthastri* were found on *Mentha aquatica* at the margin of IoW Pond.

11.ix.2004: investigation of suspicious holes in the leaves of dog's mercury *Mercurialis perennis* growing by Kelsey's Pond revealed several of the shiny blue flea beetle *Hermaeophaga mercurialis* (Fabricius). This beetle is a rarity at Bookham largely because its foodplant is so scarce here.

12.xi.2004: a further example of the ladybird *Clitostethus arcuatus* (Rossi) was beaten from ivy growing on an old oak trunk at the side of Common Road by Roger Booth. This tiny beetle, which has RDBI status, is a Bookham speciality.

Other invertebrates (Ian Menzies)

27.iv.2004: colonies of the slender ground-hopper *Tetrix subulata* were found in marshy areas at margin of IoW Pond and on Bayfield Plain. Unlike grasshoppers (Acrididae) the closely related ground-hoppers (Tetrigidae) usually reach maturity in the spring rather than during the summer.

12.vi.2004: two adults of the shieldbug *Stollia fabricii* were found on woundwort by Merritt's Cottage.

19.vii.2004: four nymphs of oak bush-cricket *Meconema thalassina* were found by beating at the side of Banks Path.

27.vii.2004: a few long-winged coneheads *Conocephalus discolor* and Roesel's bush-cricket *Metrioptera roeselii* are now stridulating on the Common.

14.viii.2004: Grasshoppers and other insects Field Study Day, leader Ian Menzies:

Central Plain: bush-crickets *Conocephalus discolor, Leptophyes punctatissima, Meconema thalassina, Metrioptera roeselii, Pholidoptera griseoaptera*; grasshoppers *Chorthippus parallelus, Omocestus viridulus*; and the ground hopper *Tetrix undulata* were present. Heteroptera seen included the squash-bugs *Gonocerus acuteangulatus* (box bug) and *Coreus marginatus*, also the shieldbugs *Dolycoris baccarum, Picromerus bidens* and *Piezodorus literatus* (gorse shieldbug).

Wisley Common: visited in the early afternoon. *Metrioptera brachyptera* the bog bush-cricket was abundant and the colony of wood cricket *Nemobius sylvestris* doing well, but the colony of short-winged conehead bush-crickets *Conocephalus dorsalis* in the reeds at the pond margin appeared to be reduced in number this year. As noted last year there was an astonishing abundance of water boatmen and beetles, including three large carnivorous water beetles *Dytiscus marginalis*, found in a cattle watering tank.

Fairmile Common: visited in the late afternoon. In addition to the bog bush-cricket *Metrioptera brachyptera*, this delightful, sandy area with abundant purple heather *Erica cinerea* supports an abundance of shorthorn grasshoppers which include the stripe-winged grasshopper *Stenobothrus lineatus* (plentiful this year), mottled grasshopper *Myrmeliotettix maculatus* (abundant as usual), meadow grasshopper *Chorthippus parallelus* (abundant), field grasshopper *Chorthippus brunneus* (plentiful) and common green grasshopper *Omocestus viridulus* (a few only). Several adult bryony ladybirds *Henosepilachna argus*, a species recently new to the UK, were beaten from gorse and white bryony growing under a belt of birch trees near the roadside.

23.viii.2004: three hornets *Vespa crabro* were observed hawking for insects visiting the carpet of *Mentha aquatica* flowers at the margin of IoW Pond. Beating the old hawthorn outside the LNHS hut was unusually productive, yielding two adult and two nymph box bugs *Gonocerus acuteangulatus*, and single examples of hawthorn shieldbug *Acanthosoma haemorrhoidalis*, sloe shieldbug *Dolycoris baccarum*, green shieldbug *Palomena prasina* and oak bush-cricket *Meconema thalassina*.

28.viii.2004: most of the long-winged conehead bush-crickets have now reached maturity and are now stridulating on the plains and in most of the

open grassy areas but, as in recent years, there was no sign of the short-winged conehead at Bookham. An area of Western Plain recently cleared of scrub now has strong colonies of field, meadow, and common green grasshoppers as well as the long-winged conehead. A slender ground-hopper *Tetrix subulata* was found with unusual black and white markings.

11.ix.2004: although the weather forecast was poor it turned out to be fine and sunny for the 'Bookham Day'. Our cherished young expert, Oliver Crundall (a rare species these days), managed to find no less than fifteen strawberry spiders *Araneus alsine* on Eastern Plain. This species was also found in new territory on the Western Plain.

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Book reviews

The biology and conservation of wild canids. Edited by David W. Macdonald and Claudio Sillero-Zubiri. Oxford University Press. 2004. 450 pp. Paperback, £39.95, ISBN 0 19 851556 1; hardback, £80, ISBN 0 19 851555 3.

As would be expected from such a renowned academic stable, this book represents another first class, definitive publication in their ever-growing list of 'must have' publications. It is exceptionally well researched and well presented throughout, although it is certainly not a coffee table book, and is edited by two of Europe's leading canid workers.

The first part comprises a review of the thirty-six canid (dogs, foxes, wolves and jackals) species currently recognized and has the feeling of a modern textbook, albeit one that is highly readable and far from dry. Most of the species summaries cover less than a page regardless of the amount of research undertaken and all have a clear distribution map of their range. This brevity is not a problem as the fifty-seven pages of comprehensive references at the back provide plenty of opportunities for continuing interest. Following these species accounts are a number of review chapters covering core topics including population genetics, canid society, management and infectious diseases.

The second part of the book comprises fifteen case studies, including our own red fox *Vulpes vulpes*. These are not simply expanded species accounts but address specific areas of research. For example, the red fox case study is subtitled 'The behavioural ecology of red foxes in urban Bristol'. All of these studies have the feel of expanded journal papers and provide an opportunity to collate some of the latest research into one easily accessible publication.

The final section, fairly predictably, covers conservation and is by far the shortest in the book at only twenty pages in length. It provides an adequate summary of all the various issues affecting canids, although I would personally prefer the conservation sections of all such publications to be expanded.

In summary, I would recommend everyone interested in wild canids to buy this book; it is readable, accessible and brings the various topics right up to date. It is an important and excellent work that deserves to be as widely read as possible.

CLIVE HERBERT

The Entomological Club and Verrall Supper. A history (1826–2004). Pamela Gilbert. The Entomological Club, London. 2005. 81 pp., quarto softback. No ISBN. £25 incl. p. & p. from (and cheques payable to) The Entomological Club, 116A Shinfield Road, Reading RG2 7DA.

The Entomological Club was founded in 1826 when four young men established a club devoted to insects, seven years before the founding of the Entomological Society of London. They decided at the beginning to limit the membership to eight and that with this small number of enthusiasts, well-known to each other, the Club would not founder as had some earlier entomological associations. Thus, The Entomological Club is not only the earliest extant entomological society, but it has continued in unbroken existence for almost 180 years.

The author, as Entomology librarian at the Natural History Museum for many years, was in an appropriate place to research the Club, but, as she says in her preface 'it was not until I made a survey of the archives that I realised how little documentation was available, and how speculative parts of it might need to be'. That she has succeeded admirably is clear for all to see in the resulting history — one that will stand strongly amongst other chronicles of natural history and natural historians which have appeared in recent years.

The Verrall Supper is named after George Henry Verrall (1848–1911) who had been invited to join The Entomological Club in 1887. He was a wealthy man and the annual meeting under his chairmanship was a lavish affair held at the Holborn Restaurant in London. Verrall was a generous host, frequently inviting more than a hundred guests, and making sure that they were introduced to each other. One of the frequent guests at the 'Verrall' was the coleopterist Martin Jacoby (1842–1907) whose profession was as member of the Hallé Orchestra, and he would entertain the gathering with a violin recital. At another dinner, the menu showed that a piano would be provided.

Of the four founder members of the Club, George Samouelle (d. 1846) who was apparently the senior, had worked for a number of years at the British Museum. On one occasion he was reprimanded by the Trustees for giving assistance to nine students, helping them to identify insects! In more-recent decades, although staff have been discouraged spending too much time helping students and other enquirers, much valuable material has been added to the collections in this way. Indeed, numbers of amateur naturalists have become long-time honorary associates of the Natural History Museum to the benefit of the Museum (and the nation) in exchange for bench space and access to the libraries and collections.

The 'Origins, vicissitudes and the membership', 'The Verrall Supper' and 'Club members — brief lives' (good portraits and brief biographies) are the main sections of the book. I have greatly enjoyed reading it and especially learning more of entomologists whom I have either known personally or even just read about in the past. I recommend this valuable contribution to the history of British natural history to all interested in our science.

K. H. HYATT

Fungi in London during 2004

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Abstract

Fungus records for London in 2004 are detailed. Notable finds are *Podoscypha multizonata* at Beckenham Place Park, *Enteloma sepium* at a former bomb site in Haringey, and *Auriculariopsis ampla* at Railway Fields, also in Haringey.

Introduction

In my first full year as fungus recorder there have been abundant collections and identifications throughout the period, not just as formerly in the autumn foray season. Keir Mottram set up the Yahoo group londonfungi (http://uk.groups.yahoo.com/group/londonfungi/) in the spring, which we jointly moderate. Do please visit it and join if you are at all interested in the fifth kingdom. The site has been a clearing house for large numbers of records and queries. On checking my e-mail I see that I have received or sent 439 messages related to fungi in the London area during 2004, much of it through the website. Consequently I now have records scattered through the whole area and for many more species than could have been recorded on a one day outing in autumn.

Fifty forayers attended the Haringey Grand Annual Fungus Foray on 31 October 2004 visiting the usual sites around the borough. After plentiful rain during the summer and especially good rainfalls in October the woods were full of fungi; the kind of flush that has not been seen for several years, which some have attributed to over-collecting. However the response to heavy rain at the right time proves that the fungi are still there — just waiting for the right conditions to put up their fruiting bodies. The species list was just under double that noted in 2003 after the exceptionally dry summer and autumn of that year. It included many ectomycorrhizal species that had failed completely in 2003 such as the milk caps, russulas, boletes and funnel caps. Of particular note *Agrocybe cylindracea* put in an appearance at many sites including Railway Fields and Alexandra Park. This is a southern species that is usually regarded as rare or uncommon in the UK. It is handsome, easily recognized and delicious, so very welcome, even if it is another sign of climate change.

My appeal for waxcap records bore spectacular fruit. Three new sites in London can now be noted as of regional importance for grassland quality based on finding six or more species at a single visit. The sites are Alexandra Park — six species, Kensall Green Cemetery — six species (recorded by Andy Overall) and Trent Country Park — eight species (recorded by Margaret Thomas). Previously the only known site of regional importance in London was Kew Gardens (fourteen species over many years recording).

Notable finds

A new site for *Podoscypha multizonata* was recorded by Mark Spencer at Beckenham Place Park (VC16). This is an international rarity for which the UK has special responsibility.

Keir Mottram found *Enteloma sepium*, a national rarity, at a former bomb site in Haringey. He also found *Auriculariopsis ampla* at Railway Fields, confirmed by Andy Overall. This is a very uncommon fungus indeed, not being pictured in any of the field guides.

LONDON FUNGI RECORDS, 2004

Taxonomic index

ASCOMYCOTA

HYPOCREALES

Hypocreaceae

Nectria cinnabarina

Branch, dead, neutral semi-improved grassland, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

LEOTIALES

Leotiaceae

Ascocoryne

As *Ascocoryne sp.*, Doubtful record, parkland & scattered trees, Site: Kenwood House, TQ271873, Middlesex, Col.: J. & D. Devos, Det.: K. Mottram, 28.xi.2004.

Bulgaria inquinans

Quercus, branch, dead, woodland & scrub, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, Conf.: K. Mottram, 31.x.2004.

PEZIZALES

Helvellaceae

Helvella lacunosa

Acidic grassland, Site: Gillespie Park, TQ314862, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, 7.xi.2004.

Soil, woodland & scrub, Site: Railway Fields, TQ316881, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Morchellaceae

Mitrophora semilibera

Garden, Site: Purley TQ315615, Col.: P. Sellar, Det.: E. G. D. Tuddenham.

Otideaceae

Aleuria aurantia

Soil, woodland & scrub, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Melastiza chateri

Woodland & scrub, Site: Abney Park, TQ333868, Middlesex, Col.: G. O'Abney, Det.: G. O'Abney, 9.03.2004.

Melastiza scotica

Doubtful record, broad-leaved semi-natural woodland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, 31.x.2004.

Pezizaceae

Peziza repanda

Wood chips, garden, Site: Alexandra Park, TQ301901, Middlesex, Col.: E.G.D. Tuddenham, Det.: A. Overall, 23.iv.2004.

Peziza vesiculosa

Wood chips, neutral semi-improved grassland, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

XYLARIALES

Xylariaceae

Daldinia concentrica

Doubtful record, *AceR. pseudoplatanus*, trunk, dead, mixed semi-natural woodland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Fraxinus, branch, dead, neutral semi-improved grassland, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Hypoxylon fragiforme

Parkland & scattered trees, Site: Kenwood House, TQ271873, Middlesex, Col.: J. & D. Devos, Det.: K. Mottram, 28.xi.2004.

Xylaria hypoxylon

Wood, dead, woodland & scrub, Site: Gillespie Park, TQ314862, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, 7.xi.2004.

Stump, dead, woodland & scrub, Site: Railway Fields, TQ316881, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

BASIDIOMYCOTA

BASIDIOMYCETES

AGARICALES

Agaricaceae

Agaricus arvensis

Site: Ruskin Park, TQ325757, Surrey, Col.: H. Brindley, Det.: H. Brindley, 1.vi.2004.

Poa, soil, neutral semi-improved grassland, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Quercus robur, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Agaricus augustus

Poa, soil, neutral semi-improved grassland, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Quercus robur, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

As *Agaricus xanthoderma*, *Poa*, soil, neutral semi-improved grassland, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Agaricus silvaticus

Woodland & scrub, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Quercus robur, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Lepiota cristata

Soil, woodland & scrub, Site: Railway Fields, TQ316881, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Lepiota ochraceofulva

Soil, woodland & scrub, Site: Railway Fields, TQ316881, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Macrolepiota procera

As *Lepiota procera*, parkland & scattered trees, Site: Hampstead Heath Extension, TQ259876, Middlesex, Col.: Anon., Det.: M. Nagle, 31.x.2004.

Macrolepiota rhacodes

Soil, woodland & scrub, Site: Gillespie Park, TQ314862, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, 07.xi.2004.

Soil, neutral semi-improved grassland, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Quercus robur, soil, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Amanitaceae

Amanita citrina

Quercus robur, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Amanita muscaria

Betula pubescens, soil, woodland & scrub, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Castanea sativa, soil, parkland & scattered trees, Site: Kenwood House, TQ271873, Middlesex, Col.: J. & D. Devos, Det.: J. & D. Devos, 6.xi.2004.

Quercus robur, soil, woodland & scrub, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Bolbitiaceae

Agrocybe cylindracea

Branch, dead, woodland & scrub, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, Conf.: K. Mottram, 31.x.2004.

Populus, branch, dead, woodland & scrub, Site: Railway Fields, TQ316881, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Coprinaceae

Coprinus atramentarius

Soil, neutral semi-improved grassland, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Coprinus lagopus

Soil, neutral semi-improved grassland, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Coprinus micaceus

Parkland & scattered trees, Site: Kenwood House, TQ271873, Middlesex, Col.: J. & D. Devos, Det.: K. Mottram, 28.xi.2004.

Soil, neutral semi-improved grassland, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Coprinus plicatilis

Acidic grassland, Site: Gillespie Park, TQ314862, Middlesex, Col.: E.G.D. Tuddenham, Det.: K. Mottram, 7.xi.2004.

Coprinus xanthothrix

As *Coprinus xanthrix*, woodland & scrub, Site: Abney Park, TQ333868, Middlesex, Col.: G. O'Abney, Det.: D Schafer, 9.iv.2004.

Lacrymaria velutina

As *Lacrymaria lacrymabunda*, acidic grassland, Site: Gillespie Park, TQ314862, Middlesex, Col.: R. Myers, Det.: K. Mottram, 7.xi.2004.

Psathyrella conopilea

Parkland & scattered trees, Site: Kenwood House, TQ271873, Middlesex, Col.: J. & D. Devos, Det.: K. Mottram, 28.xi.2004.

Entolomataceae

Entoloma aprile

Site: Hampstead Heath, TQ276862, Col.: A. Overall, Det.: A. Overall.

Entoloma sepium

Prunus, Site: Granville Road Spinney, TQ317906, Middlesex, Col.: K. Mottram, Det.: A. Overall, 16.v.2004.

Entoloma sericeum

Holcus mollis, acidic grassland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Rhodocybe popinalis

Poa, neutral semi-improved grassland, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Hygrophoraceae

Hygrocybe ceracea

Poa pratensis, acidic grassland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, Conf.: K. Mottram, 31.x.2004.

Hygrocybe coccinea

Poa pratensis, acidic grassland, Site: Alexandra Park, TQ301901, Middlesex, Col.: K. Mottram, Det.: E.G.D. Tuddenham, Conf.: K. Mottram, 31.x.2004.

Poa pratensis, acidic grassland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, Conf.: K. Mottram, 31.x.2004.

Hygrocybe conica

Acidic grassland, Site: Gillespie Park, TQ314862, Middlesex, Col.: Anon., Det.: K. Mottram, 7.xi.2004.

Poa pratensis, acidic grassland, Site: Alexandra Park, TQ301901, Middlesex, Col.: E.G.D. Tuddenham, Det.: E.G.D. Tuddenham, Conf.: K. Mottram, 31.x.2004.

Hygrocybe irrigata

As *Hygrocybe unguinosa, Poa,* Site: Trent Park, TQ288973, Middlesex, Col.: M. Thomas, 13.xi.2004.

Hygrocybe miniata

As *Hygrocybe strangulata, Poa,* Site: Trent Park, TQ288973, Middlesex, Col.: M. Thomas, 13.xi.2004.

Hygrocybe pratensis

Poa pratensis, acidic grassland, Site: Alexandra Park, TQ301901, Middlesex, Col.: E.G.D. Tuddenham, Det.: E.G.D. Tuddenham, Conf.: K. Mottram, 31.x.2004.

Hygrocybe psittacina

Poa pratensis, acidic grassland, Site: Alexandra Park, TQ301901, Middlesex, Col.: E.G.D. Tuddenham, Det.: E.G.D. Tuddenham, Conf.: K. Mottram, 31.x.2004.

Hygrocybe punicea

Poa, Site: Trent Park, TQ288973, Middlesex, Col.: M. Thomas, 13.xi.2004.

Hygrocybe virginea

Acidic grassland, Site: Gillespie Park, TQ314862, Middlesex, Col.: Anon., Det.: K. Mottram, 7.xi.2004.

Poa pratensis, acidic grassland, Site: Alexandra Park, TQ301901, Middlesex, Col.: E.G.D. Tuddenham, Det.: E.G.D. Tuddenham, Conf.: K. Mottram, 31.x.2004.

Pluteaceae

Pluteus cervinus

Trunk, dead, broad-leaved semi-natural woodland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Parkland & scattered trees, Site: Kenwood House, TQ271873, Middlesex, Col.: J. & D. Devos, Det.: K. Mottram, 28.xi.2004.

Trunk, dead, neutral semi-improved grassland, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Site: Ruskin Park, TQ325757, Surrey, Col.: H Brindley, Det.: H. Brindley, 20.vii.2004.

Soil, woodland & scrub, Site: Gillespie Park, TQ314862, Middlesex, Col.: K. Mottram, Det.: K. Mottram, 7.xi.2004.

Quercus robur, log, rotten, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Volvariella gloiocephala

Acidic grassland, Site: Gillespie Park, TQ314862, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, 7.xi.2004.

Volvariella speciosa

Wood chips, neutral semi-improved grassland, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Soil, parkland & scattered trees, Site: Hampstead Heath, TQ276862, Col.: M Nagle, Det.: M. Nagle, 21.vi.2004.

Strophariaceae

Hypholoma fasciculare

Acidic grassland, Site: Gillespie Park, TQ314862, Middlesex, Col.: MicK. Massie, Det.: K. Mottram, 7.xi.2004.

Wood, dead, broad-leaved semi-natural woodland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, Conf.: K. Mottram, 31.x.2004.

Parkland & scattered trees, Site: Kenwood House, TQ271873, Middlesex, Col.: J. & D. Devos, Det.: K. Mottram, 28.xi.2004.

Parkland & scattered trees, Site: Hampstead Heath Extension, TQ259876, Middlesex, Col.: Anon., Det.: M. Nagle, 31.x.2004.

Crataegus × *lavallei*, trunk, dead, neutral semi-improved grassland, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Quercus robur, branch, dead, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Pholiota adiposa

Doubtful record, *Populus*, trunk, dead, broad-leaved semi-natural woodland, Site: Alexandra Park, TQ301901, Middlesex, Col.: E.G.D. Tuddenham, Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Psilocybe semilanceata

Poa annua, root, acidic grassland, Site: Alexandra Park, TQ301901, Middlesex, Col.: E.G.D. Tuddenham, Det.: E.G.D. Tuddenham, Conf.: K. Mottram, 31.x.2004.

Stropharia aeruginosa

Acidic grassland, Site: Gillespie Park, TQ314862, Middlesex, Col.: Anon., Det.: K. Mottram, 7.xi.2004.

Stropharia inuncta

Poa, neutral semi-improved grassland, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Tricholomataceae

Armillaria gallica

Soil, neutral semi-improved grassland, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Armillaria mellea

Quercus robur, soil, woodland & scrub, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, Conf.: K. Mottram, 31.x.2004.

Calocybe gambosa

Site: Alexandra Park, TQ301901, Middlesex, Col.: E.G.D. Tuddenham, Det.: E.G.D. Tuddenham, 10.v.2004.

Clitocybe geotropa

Quercus robur, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Clitocybe metachroa

Quercus robur, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Clitocybe nebularis

Acidic grassland, Site: Gillespie Park, TQ314862, Middlesex, Col.: R. Myers, Det.: K. Mottram, 7.xi.2004.

Mixed semi-natural woodland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, Conf.: K. Mottram, 31.x.2004.

Parkland & scattered trees, Site: Hampstead Heath Extension, TQ259876, Middlesex, Col.: Anon., Det.: M Nagle, 31.x.2004.

Quercus robur, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Clitocybe odora

Parkland & scattered trees, Site: Hampstead Heath Extension, TQ259876, Middlesex, Col.: Anon., Det.: M. Nagle, 31.x.2004.

Clitocybe phaeophthalma

Wood chips, garden, Site: Alexandra Park, TQ301901, Middlesex, Col.: E.G.D. Tuddenham, Det.: E.G.D. Tuddenham, 11.i.2004.

Clitocybe phyllophila

Parkland & scattered trees, Site: Hampstead Heath Extension, TQ259876, Middlesex, Col.: Anon., Det.: M. Nagle, 31.x.2004.

Clitocybe rivulosa

Wixed semi-natural woodland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, Conf.: K. Mottram, 31.x.2004.

Quercus robur, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Flammulina velutipes

Woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Stump, dead, neutral semi-improved grassland, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Gymnopus dryophilus

As *Collybia dryophila*, mixed semi-natural woodland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, Conf.: K. Mottram, 31.x.2004.

Laccaria amethystina

As *Laccaria amethystea*, broad-leaved semi-natural woodland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, Conf.: K. Mottram, 31.x.2004.

Quercus robur, soil, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Laccaria laccata

Broad-leaved semi-natural woodland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Quercus robur, soil, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Lepista flaccida

As *Clitocybe flaccida*, wood, dead, woodland & scrub, Site: Gillespie Park, TQ314862, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, 7.xi.2004.

As *Clitocybe flaccida*, soil, neutral semi-improved grassland, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

As *Clitocybe flaccida*, *Quercus robur*, wood, dead, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

As *Lepista inversa*, tree, heathland, Site: Hounslow Heath, TQ123742, Middlesex, Col.: O. Crundall, Det.: O. Crundall.

As *Lepista inversa*, tree, heathland, Site: Hounslow Heath, TQ123742, Middlesex, Col.: O. Crundall, Det.: O. Crundall, 5.xii.2004.

As *Lepista inversa*, tree, heathland, Site: Hounslow Heath, TQ123742, Middlesex, Col.: O. Crundall, Det.: O. Crundall.

Lepista nuda

Soil, woodland & scrub, Site: Railway Fields, TQ316881, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Acidic grassland, Site: Gillespie Park, TQ314862, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, 7.xi.2004.

Parkland & scattered trees, Site: Kenwood House, TQ271873, Middlesex, Col.: J. & D. Devos, Det.: K. Mottram, 28.xi.2004.

Site: Abney Park, TQ333868, Middlesex, Col.: G. O'Abney, Det.: K. Mottram, 2.i.2004.

Parkland & scattered trees, Site: Hampstead Heath Extension, TQ259876, Middlesex, Col.: Anon., Det.: M. Nagle, 31.x.2004.

Site: Ruskin Park, TQ325757, Surrey, Col.: H. Brindley, Det.: H. Brindley, 05.ii.2004.

Quercus, parkland & scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Quercus robur, soil, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Lepista saeva

Acidic grassland, Site: Gillespie Park, TQ314862, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, 7.xi.2004.

Poa, neutral semi-improved grassland, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Lepista sordida

Acidic grassland, Site: Gillespie Park, TQ314862, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, 7.xi.2004.

Soil, woodland & scrub, Site: Railway Fields, TQ316881, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Marasmiellus ramealis

Soil, woodland & scrub, Site: Gillespie Park, TQ314862, Middlesex, Col.: K. Mottram, Det.: K. Mottram, 7.xi.2004.

Marasmius oreades

Site: Ruskin Park, TQ325757, Surrey, Col.: H. Brindley, Det.: H. Brindley, 19.vii.2004.

Poa annua, acidic grassland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Mycena filopes

Parkland & scattered trees, Site: Hampstead Heath Extension, TQ259876, Middlesex, Col.: Anon., Det.: M. Nagle, 31.x.2004.

Mycena flavoalba

Poa, neutral semi-improved grassland, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Poa annua, acidic grassland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Mycena galericulata

Parkland & scattered trees, Site: Kenwood House, TQ271873, Middlesex, Col.: J. & D. Devos, Det.: K. Mottram, 28.xi.2004.

Wood, dead, woodland & scrub, Site: Gillespie Park, TQ314862, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, 7.xi.2004.

Parkland & scattered trees, Site: Hampstead Heath Extension, TQ259876, Middlesex, Col.: Anon., Det.: M. Nagle, 31.x.2004.

Mycena haematopus

Wood, dead, woodland & scrub, Site: Gillespie Park, TQ314862, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, 7.xi.2004.

Mycena polygramma

Broad-leaved semi-natural woodland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Quercus robur, stump, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Mycena pura

Parkland & scattered trees, Site: Hampstead Heath Extension, TQ259876, Middlesex, Col.: Anon., Det.: M Nagle, 31.x.2004.

As *Phlebia sp.*, Doubtful record, parkland & scattered trees, Site: Hampstead Heath Extension, TQ259876, Middlesex, Col.: Anon., Det.: M. Nagle, 31.x.2004.

Mycena pura* f. *alba

Quercus robur, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Mycena pura* var. *rosea

As *Mycena rosea*, *Quercus robur*, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Mycena vitilis

Parkland & scattered trees, Site: Kenwood House, TQ271873, Middlesex, Col.: J. & D. Devos, Det.: K. Mottram, 28.xi.2004.

Poa, neutral semi-improved grassland, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Panellus serotinus

Parkland & scattered trees, Site: Kenwood House, TQ271873, Middlesex, Col.: J. & D. Devos, Det.: K. Mottram, 28.xi.2004.

Panellus stipticus

Parkland & scattered trees, Site: Kenwood House, TQ271873, Middlesex, Col.: J. & D. Devos, Det.: K. Mottram, 28.xi.2004.

Site: Abney Park, TQ333868, Middlesex, Col.: G. O'Abney, Det.: K. Mottram, 2.i.2004.

As *Phlebia meresmoides*, parkland & scattered trees, Site: Kenwood House, TQ271873, Middlesex, Col.: J. & D. Devos, Det.: K. Mottram, 28.xi.2004.

Rhodocollybia butyracea

As *Collybia butyracea*, mixed semi-natural woodland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, Conf.: K. Mottram, 31.x.2004.

As *Collybia butyracea*, parkland & scattered trees, Site: Hampstead Heath Extension, TQ259876, Middlesex, Col.: Anon., Det.: M. Nagle, 31.x.2004.

As *Collybia butyracea*, soil, woodland & scrub, Site: Gillespie Park, TQ314862, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, 7.xi.2004.

Rhodotus palmatus

Ulmus procera, trunk, dead, broad-leaved semi-natural woodland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, Conf.: K. Mottram, 31.x.2004.

Rickenella fibula

Moss, acidic grassland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, Conf.: K. Mottram, 31.x.2004.

Tricholoma argyraceum

As *Tricholoma scalpturatum*, broad-leaved semi-natural woodland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

As *Tricholoma scalpturatum*, *Poa*, woodland & scrub, Site: Railway Fields, TQ316881, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Tricholoma cingulatum

As *Tricholoma cingulatum*, woodland & scrub, Site: Gillespie Park, TQ314862, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, 7.xi.2004.

Tricholoma gausapatum

Broad-leaved semi-natural woodland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Poa, woodland & scrub, Site: Railway Fields, TQ316881, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Tricholoma lascivum

Broad-leaved semi-natural woodland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Tricholoma saponaceum

Doubtful record, acidic grassland, Site: Gillespie Park, TQ314862, Middlesex, Col.: Anon., Det.: K. Mottram, 7.xi.2004.

Tricholoma sulphureum

Broad-leaved semi-natural woodland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Auriculariales

Auriculariaceae

Auricularia auricula-judae

As *Auricularia auricula*, parkland & scattered trees, Site: Kenwood House, TQ271873, Middlesex, Col.: J. & D. Devos, Det.: K. Mottram, 28.xi.2004.

Sambucus nigra, branch, dead, woodland & scrub, Site: Railway Fields, TQ316881, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Sambucus nigra, branch, dead, woodland & scrub, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, Conf.: K. Mottram, 31.x.2004.

Auricularia mesenterica

Broad-leaved semi-natural woodland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Boletales

Boletaceae

Boletus albidus

As *Boletus radicans*, Site: Avenue Gardens, TQ304905, Middlesex, Col.: K. Mottram, 6.ix.2004.

Boletus edulis

Quercus, woodland & scrub, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, Conf.: K. Mottram, 31.x.2004.

Quercus robur, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Boletus impolitus

Quercus robur, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Leccinum duriusculum

Populus tremula, parkland & scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: E.G.D. Tuddenham, Det.: E.G.D. Tuddenham, Conf.: K. Mottram, 5.viii.2004.

Paxillaceae

Paxillus involutus

Soil, woodland & scrub, Site: Railway Fields, TQ316881, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Soil, woodland & scrub, Site: Gillespie Park, TQ314862, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, 7.xi.2004.

Strobilomycetaceae

Chalciporus piperatus

As *Boletus piperatus*, *Quercus*, woodland & scrub, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, Conf.: K. Mottram, 31.x.2004.

Xerocomaceae

Xerocomus chrysenteron

As *Boletus chrysenteron*, Site: Trent Park, TQ288973, Middlesex, Col.: K. Mottram, Det.: K. Mottram, 23.vii.2004.

Xerocomus porosporus

As *Boletus porosporus*, Site: Trent Park, TQ288973, Middlesex, Col.: K. Mottram, Det.: K. Mottram, 23.vii.2004.

Xerocomus rubellus

As *Boletus rubellus*, Site: Trent Park, TQ288973, Middlesex, Col.: K. Mottram, Det.: K. Mottram, 23.vii.2004.

Cantharellales

Clavariaceae

Clavaria argillacea

Doubtful record, acidic grassland, Site: Gillespie Park, TQ314862, Middlesex, Col.: Anon., Det.: K. Mottram, 7.xi.2004.

Clavulinopsis helvola

Acidic grassland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, Conf.: K. Mottram, 31.x.2004.

Clavulinopsis luteoalba

Broad-leaved semi-natural woodland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Cortinariales

Cortinariaceae

Cortinarius decipiens

Doubtful record, mixed semi-natural woodland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: K. Mottram, 31.x.2004.

Gymnopilus junonius

Quercus robur, stump, dead, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Gymnopilus spectabilis

Crataegus X lavallei, trunk, dead, neutral semi-improved grassland, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Populus, trunk, dead, broad-leaved semi-natural woodland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Hebeloma crustuliniforme

Woodland & scrub, Site: Railway Fields, TQ316881, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Acidic grassland, Site: Gillespie Park, TQ314862, Middlesex, Col.: M. Massie, Det.: K. Mottram, 7.xi.2004.

Broad-leaved semi-natural woodland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, Conf.: K. Mottram, 31.x.2004.

Quercus robur, soil, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Hebeloma pusillum

Soil, woodland & scrub, Site: Gillespie Park, TQ314862, Middlesex, Col.: K. Mottram, Det.: K. Mottram, 7.xi.2004.

Inocybe geophylla

Parkland & scattered trees, Site: Hampstead Heath Extension, TQ259876, Middlesex, Col.: Anon., Det.: M Nagle, 31.x.2004.

Inocybe rimosa

Broad-leaved semi-natural woodland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Crepidotaceae

Crepidotus variabilis

Twig, dead, mixed semi-natural woodland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Tubaria autochthona

Doubtful record, *Crataegus*, soil, heathland, Site: Hounslow Heath, TQ123742, Middlesex, Col.: O. Crundall, Det.: O. Crundall, 5.xii.2004.

Soil, woodland & scrub, Site: Gillespie Park, TQ314862, Middlesex, Col.: K. Mottram, Det.: K. Mottram, 7.xi.2004.

Dacrymycetales

Dacrymycetaceae

Calocera cornea

Parkland & scattered trees, Site: Kenwood House, TQ271873, Middlesex, Col.: J. & D. Devos, Det.: K. Mottram, 28.xi.2004.

Fistulinales

Fistulinaceae

Fistulina hepatica

Parkland & scattered trees, Site: Kenwood House, TQ271873, Middlesex, Col.: J. & D. Devos, Det.: K. Mottram, 28.xi.2004.

Ganodermatales

Ganodermataceae

Ganoderma applanatum

Site: Isleworth Ait, TQ165755, Middlesex, Col.: M. Massie, Det.: K. Mottram.

Ganoderma australe

Acidic grassland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Quercus, trunk, neutral semi-improved grassland, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Ganoderma lucidum

Aesculus hippocastanum, parkland & scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Quercus trunk, Site: Highgate Wood, TQ282887, Col.: Anon., Det.: S. Starshine, 8.ix.2004.

Lycoperdales

Geastraceae

Geastrum triplex

Quercus robur, leaf, litter, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Lycoperdaceae

Handkea excipuliformis

As *Calvatia excipuliformis*, parkland & scattered trees, Site: Hampstead Heath Extension, TQ259876, Middlesex, Col.: Anon., Det.: M. Nagle, 31.x.2004.

As *Calvatia excipuliformis*, woodland & scrub, Site: Railway Fields, TQ316881, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Lycoperdon pyriforme

Stump, dead, neutral semi-improved grassland, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Quercus robur, stump, dead, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Poriales

Coriolaceae

Bjerkandera adusta

Populus, branch, dead, woodland & scrub, Site: Railway Fields, TQ316881, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Daedaleopsis confragosa

Parkland & scattered trees, Site: Kenwood House, TQ271873, Middlesex, Col.: J. & D. Devos, Det.: K. Mottram, 28.xi.2004.

Grifola frondosa

Parkland & scattered trees, Site: Kenwood House, TQ271873, Middlesex, Col.: J. & D. Devos, Det.: K. Mottram, 28.xi.2004.

Quercus robur, leaf, litter, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Laetiporus sulphureus

Site: Isleworth Ait, TQ165755, Middlesex, Col.: M. Massie, Det.: K. Mottram, 13.xi.2004.

Meripilus giganteus

Quercus, trunk, base, neutral semi-improved grassland, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Oligoporus subcaesius

As *Postia subcaesia*, woodland & scrub, Site: Abney Park, TQ333868, Middlesex, Col.: G. O'Abney, Det.: G. O'Abney, 26.ii.2004.

Trametes gibbosa

Branch, dead, broad-leaved semi-natural woodland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, Conf.: K. Mottram, 31.x.2004.

Trametes versicolor

Parkland & scattered trees, Site: Kenwood House, TQ271873, Middlesex, Col.: J. & D. Devos, Det.: K. Mottram, 28.xi.2004.

Wood, dead, woodland & scrub, Site: Gillespie Park, TQ314862, Middlesex, Col.: R. Myers, Det.: E.G.D. Tuddenham, 7.xi.2004.

Trunk, dead, woodland & scrub, Site: Railway Fields, TQ316881, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Quercus robur, soil, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Quercus robur, branch, dead, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Lentinaceae

Pleurotus dryinus

Trunk, dead, neutral semi-improved grassland, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Pleurotus ostreatus

Parkland & scattered trees, Site: Kenwood House, TQ271873, Middlesex, Col.: J. & D. Devos, Det.: K. Mottram, 28.xi.2004.

Polyporaceae

Polyporus badius

Wood, dead, woodland & scrub, Site: Gillespie Park, TQ314862, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, 7.xi.2004.

Russulales

Russulaceae

Lactarius quietus

Quercus, broad-leaved semi-natural woodland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Quercus robur, soil, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Lactarius subdulcis

Parkland & scattered trees, Site: Hampstead Heath Extension, TQ259876, Middlesex, Col.: Anon., Det.: M Nagle, 31.x.2004.

Quercus robur, soil, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Lactarius tabidus

Quercus robur, soil, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Russula atropurpurea

Broad-leaved semi-natural woodland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, Conf.: K. Mottram, 31.x.2004.

Doubtful record, acidic grassland, Site: Gillespie Park, TQ314862, Middlesex, Col.: R. Myers, Det.: E.G.D. Tuddenham, 7.xi.2004.

Russula brunneoviolacea

Quercus robur, soil, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Russula cyanoxantha

Acidic grassland, Site: Gillespie Park, TQ314862, Middlesex, Col.: E.G.D. Tuddenham, Det.: K. Mottram, 7.xi.2004.

Russula solaris

Quercus robur, soil, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Sclerodermatales

Sclerodermataceae

Scleroderma citrinum

Broad-leaved semi-natural woodland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, Conf.: K. Mottram, 31.x.2004.

Poa, neutral semi-improved grassland, Site: Tottenham Cemetery, TQ332909, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Quercus robur, soil, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Stereales

Meruliaceae

Auriculariopsis ampla

Doubtful record, *Populus*, branch, dead, woodland & scrub, Site: Railway Fields, TQ316881, Middlesex, Col.: K. Mottram, Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 28.i.2004.

Chondrostereum purpureum

Prunus avium, wood, dead, woodland, Site: Queen's Wood, TQ288886, Middlesex, Col.: Anon., Det.: K. Mottram, Conf.: E.G.D. Tuddenham, 31.x.2004.

Phlebia merismoides

Parkland and scattered trees, Site: Kenwood House, TQ271873, Middlesex, Col.: J. & D. Devos, Det.: K. Mottram, 28.xi.2004.

Phlebia tremellosa

As *Merulius tremellosus*, parkland & scattered trees, Site: Kenwood House, TQ271873, Middlesex, Col.: J. & D. Devos, Det.: K. Mottram, 28.xi.2004.

Podoscyphaceae

Podoscypha multizonata

Site: Hampstead Heath, TQ276862, Middlesex, Col.: A. Overall, Det.: A. Overall, Conf.: E.G.D. Tuddenham, 30.viii.2004.

Quercus robur, root, parkland & scattered trees, Site: Alexandra Park, TQ301901, Middlesex, Col.: E.G.D. Tuddenham, Det.: E.G.D. Tuddenham, Conf.: K. Mottram, 31.x.2004.

Stereaceae

Stereum hirsutum

Parkland & scattered trees, Site: Kenwood House, TQ271873, Middlesex, Col.: J. & D. Devos, Det.: K. Mottram, 28.xi.2004.

Branch, dead, broad-leaved semi-natural woodland, Site: Alexandra Park, TQ301901, Middlesex, Col.: Anon., Det.: E.G.D. Tuddenham, Conf.: K. Mottram, 31.x.2004.

Stereum rugosum

Parkland & scattered trees, Site: Kenwood House, TQ271873, Middlesex, Col.: J. & D. Devos, Det.: K. Mottram, 28.xi.2004.

Tremellales

Exidiaceae

Exidia glandulosa

Parkland & scattered trees, Site: Hampstead Heath Extension, TQ259876, Middlesex, Col.: Anon., Det.: M. Nagle, 31.x.2004.

Tremellaceae

Tremella mesenterica

Parkland & scattered trees, Site: Kenwood House, TQ271873, Middlesex, Col.: J. & D. Devos, Det.: K. Mottram, 28.xi.2004.

Heathland, Site: Hounslow Heath, TQ123742, Middlesex, Col.: O. Crundall, Det.: O. Crundall, 5.xii.2004.

Parkland & scattered trees, Site: Kenwood House, TQ271873, Middlesex, Col.: J. & D. Devos, Det.: K. Mottram, 28.xi.2004.

MYXOMYCOTA

MYXOMYCETES

Physarales

Didymiaceae

Mucilago crustacea

Acidic grassland, Site: Gillespie Park, TQ314862, Middlesex, Col.: MicK. Massie, Det.: K. Mottram, 7.xi.2004.

253 records, 166 species.

Site references

Abney Park, TQ333868, Middlesex
Alexandra Park, TQ301901, Middlesex
Avenue Gardens, TQ304905, Middlesex
Edmonton, TQ341925, Middlesex
Gillespie Park, TQ314862, Middlesex
Granville Road Spinney, TQ317906, Middlesex
Hampstead Heath, TQ276862, Middlesex
Hampstead Heath Extension, TQ259876, Middlesex
Highgate Wood, TQ282887, Middlesex
Hounslow Heath, TQ123742, Middlesex
Isleworth Ait, TQ165755, Middlesex
Kenwood House, TQ271873, Middlesex
Purley, TQ315615, Surrey
Queen's Wood, TQ288886, Middlesex
Railway Fields, TQ316881, Middlesex
Ruskin Park, TQ325757, Surrey
Tottenham Cemetery, TQ332909, Middlesex
Trent Park, TQ288973, Middlesex

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A. Overall
Anon.
D. Schafer
E. G. D. Tuddenham
G. O'Abney
H. Brindley
J. & D. Devos
K. Mottram
M. Nagle
M. Massie
N. Legon
O. Crundall
P. Sellar
R. Myers

Associated organism index

Acer pseudoplatanus
Daldinia concentrica.

Aesculus hippocastanum
Ganoderma lucidum.

Armoracia rusticana
Cercospora armoraciae.

Betula pubescens
Amanita muscaria.

Castanea sativa
Amanita muscaria.

Crataegus
Tubaria autochthona.

Crataegus × lavallei
Gymnopilus spectabilis, Hypholoma fasciculare.

Fraxinus
Daldinia concentrica.

Holcus mollis
Entoloma sericeum.

Moss
Rickenella fibula.

Poa
Agaricus arvensis, Agaricus augustus, Lepista saeva, Mycena flavoalba, Mycena vitilis, Rhodocybe popinalis, Scleroderma citrinum, Stropharia inuncta, Tricholoma argyraceum, Tricholoma gausapatum.

Poa annua
Marasmius oreades, Mycena flavoalba, Psilocybe semilanceata.

Poa pratensis
Hygrocybe ceracea, Hygrocybe coccinea, Hygrocybe conica, Hygrocybe pratensis, Hygrocybe psittacina, Hygrocybe virginea.

Populus
Agrocybe cylindracea, Auriculariopsis ampla, Bjerkandera adusta, Gymnopilus spectabilis, Pholiota adiposa, Rigidoporus ulmarius.

Populus tremula
Leccinum duriusculum.

Prunus
Entoloma sepium.

Prunus avium
Chondrostereum purpureum.

Quercus
Boletus edulis, Bulgaria inquinans, Chalciporus piperatus, Ganoderma australe, Lactarius quietus, Lepista nuda, Meripilus giganteus.

Quercus robur
Agaricus arvensis, Agaricus augustus, Agaricus silvaticus, Amanita citrina, Amanita muscaria, Armillaria mellea, Boletus edulis, Boletus impolitus, Clitocybe geotropa, Clitocybe metachroa, Clitocybe nebularis, Clitocybe rivulosa, Geastrum triplex, Grifola frondosa, Gymnopilus junonius, Hebeloma crustuliniforme, Hypholoma fasciculare, Laccaria amethystina, Laccaria laccata, Lactarius quietus, Lactarius subdulcis, Lactarius tabidus, Lepista flaccida, Lepista nuda, Lycoperdon pyriforme, Macrolepiota rhacodes, Mycena polygramma, Mycena pura f. *alba, Mycena pura* var. *rosea, Pluteus cervinus, Podoscypha multizonata, Russula brunneoviolacea, Russula solaris, Scleroderma citrinum, Trametes versicolor.*

Sambucus nigra
Auricularia auricula-judae.

Ulmus procera
Rhodotus palmatus.

Book review

Birds in England. Andy Brown and Phil Grice. English Nature. 2005. T & A D Poyser/A & C Black, London. 694 pages. £40.00 hardback. ISBN 07136 6530 0.

For anyone with a serious interest in the conservation of our country's wild birds, this book will be a useful reference, and a welcome addition to existing sources. Dedicated to the volunteers who go out year on year, recording observations and contributing to monitoring programmes, the book manages to be not only authoritative, as you might expect coming from English Nature's ornithology team, but also in touch with the joys of amateur birding in this country. Unusually, it focuses specifically on England, rather than Britain and Ireland, or the UK.

The book begins by reviewing the conservation significance of England's avifauna, highlighting our island status on the edge of the western palaearctic, both in relation to breeding ranges and migration routes. It compares our bird diversity with that of mainland Europe and similar-sized countries elsewhere in the world, and identifies species or subspecies for which we have particular conservation responsibility. Looking to the future, it considers the likely effects of climate change on both breeding ranges and overwintering populations; for example, will milder winters in their breeding countries affect the numbers of birds which make the journey to overwinter in England in the future? There is also a fascinating section on bird migration, showing how changes in wind direction lead many unusual species to touch down on our shores.

It then reviews each of our main bird habitats — farmland, heathland, woodland, wetland and so on — together with their associated species assemblages, and explores how both the habitat and the status of individual species have changed over recent decades. Sadly, as we all know, much has been lost, and in some cases the declines may reflect factors such as changing climate which we cannot easily address. But the book is positive in tone, demonstrating measures which could be, or are being, put in place.

The bulk of the book is made up of individual accounts for all species on the British list which currently occur in England. Greater detail is given for those of highest conservation concern. For most, a brief résumé of its history in this country is followed by a discussion of changes in status, as revealed by monitoring programmes such as CBC, WBS and BBS. For high priority species in the UK Biodiversity Action Plan, such as the bittern, the book shows what is being done through the Action Plan to reverse the decline. It also discusses problem species such as the ruddy duck, an introduced species which threatens the Spanish population of the globally threatened white-headed duck, and possible, though controversial, measures for its control.

This is a comprehensive text, with a great deal of detailed information, which will be invaluable to conservation professionals, students and others who need an authoritative reference on bird conservation. Sometimes a scientist's needs to report dispassionately can make for dry reading, but not in this case. Perhaps the most attractive feature of this book, which endeared it to me, is the way the authors' sheer love of birdwatching shines through.

JAN HEWLETT

Lichens in London, 2004

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Unfortunately, 2004 was not a good year for me, but others were doing lichen work in London. Linda Davies received her PhD from Imperial College for her work on 'A Study of the Lichens of London under Contemporary Atmospheric Conditions (2002–3)'. She looked at an average of ten ashes *Fraxinus* in each of the London boroughs and, with Peter James's help, found new records, such as *Arthonia spadicea, Bacidia friesiana, B. laurocerasi, Chrysothrix flavovirens, Lecanora barkmaniana, L. persimilis* and *Melanelia exasperatula.* Environmental variables that might affect distribution are transport pollutants, temperature, bark pH, precipitation and girth. Of the seventy-four epiphytes she found 40 per cent were believed associated with nitrogen and dust. Diversity increased dramatically at sites where annual average NOx was below 150 μgm^{-3}. Most new species found were recorded below 100 μgm^{-3}. The twelve most frequently recorded species (also recorded when SO_2 was at its peak although then confined to stone) were *Physcia adscendens, Xanthoria parietina, Phaeophyscia orbicularis, Xanthoria polycarpa, Physcia tenella, Amandinea punctata, Parmelia sulcata, Lecanora expallens, Melanelia subaurifera, Xanthoria candelaria, Candelariella reflexa,* and *C. vitellina.* Fifteen of the nineteen nitrophytes (Herk 2001, Waterfield 2004) were recorded and seven of the twenty acidophytes (*Evernia prunastri, Lepraria incana, Hypogymnia physodes, Lecanora conizaeoides, Usnea cornuta, Cladonia coniocraea* and *Hypogymnia tubulosa*). Unfortunately this work has not been published and this information comes from a student poster.

Peter James published a paper with Linda Davies in the *Essex Naturalist* (2003) on some work that they did resurveying in Epping Forest. In total 167 species have been recorded in Epping but no *Pertusaria* are found now and the commonest communities are those of wayside trees. Some lichens are coming back in but there does not seem to be a clear cut picture of improvement as one moves away from central London.

There was also a DEFRA-funded project employing Rene Larsen as Research Assistant at the Natural History Museum. This looked at oaks but again there is no publicly available scientific information. The oak is chosen because it is seen as having an European-wide distribution. There are many species of oak and within London there are two native oaks and their hybrids. Their shape and size is variable and unlike the long avenues of up-lopped oak in the Netherlands on which van Herk's (2001) work is based. Finding a valid and efficient methodology for using lichens to assess air pollution is till a problem. However one must be glad there is funding for any lichen work. There is a popular article in the NERC publication *Planet Earth* downloadable from the web (Purvis 2004).

I attended a meeting on 'Lichens in a Changing Pollution Environment' (English Nature 2004) which looked at the effect of nitrogen and other pollutants. The report (No. 525) is downloadable as a PDF from the English Nature website or available from their Enquiry Service.

Work on a total species list is continuing but is more problematical than I had thought. I bought an AppleMac laptop and used FilemakerPro but found it was not compatible with the PC at the Natural History Museum and by the time I got back to it the batteries had run down and everything was useless. Sadly, I lack a good grasp of modern technology and have retreated back to cards and notebooks. The latter because of another lesson learnt — loose bits of paper have a habit of getting lost. Not so convenient for GIGL the new recording centre. Jack Laundon (1970) recorded 165 species and I have added

some from the 'Magnificent Seven' cemeteries (Waterfield 2003) and Hampstead Heath. I also have information from the British Lichen Society Bradford database run by Professor Mark Seaward but these are ten-kilometre squares and not more precisely located. Ishpi Blatchley reported *Cladonia scrabiuscula* from Chislehurst cemetery which I have on my Bradford list but without a locality. I estimate that there are about 300 lichen species inside the M25 Motorway ring — over 180 have been recorded at Kew.

I started cataloguing the lichens in the Borrer Herbarium at Kew which is a fascinating exercise as he is known as 'the father of British lichenology'. Dawson Turner published a part-finished work, *Lichenographia Britannica*, (Turner and Borrer 1839) under their joint names but Borrer is chiefly known for his contribution to Smith & Sowerby's monutmental 36-volume (1790–1814), plus 5-volume supplement (1831–66), *English Botany*, that covers seaweeds, mosses and lichens as well as flowering plants. This was a major work cataloguing what was known of the plant kingdom at that time. Although Borrer lived in Sussex he did make records in the London area, including *Parmelina tiliacea*. A stimulus to this interest in lichens was the purchase of the Linnaean collection and the donation of a definitive lichen collection to the Linnean Society by another Swede, Acharius, who is known as the 'father of lichenology'. There was a move away from the Linnaean system to a more 'natural' one and more emphasis on how things grew and reacted to their environment. The beginning of a new era. Nowadays there is a move towards more work on DNA and 'barcoding' biodiversity; however field knowledge will always be needed.

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Botanical records for 2004

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Abstract

This paper presents a selection of records of flowering plants and ferns made in the London Area in 2004.

Introduction

This paper is part of an annual series in which I present the more interesting records of vascular plants made in the London Area, selected from those which have reached me. The London Area as here defined consists of an approximation to a circle of radius 32 km, centred on St Paul's Cathedral. The records are arranged according to the vice-counties used for the division of the country into recording units by the Botanical Society of the British Isles (BSBI) and other scientific societies. In each vice-county (v.c.) records from London boroughs, with the name of the borough picked out in bold type, precede those from parts of the Area outside London, and the sequence of boroughs is roughly from the centre of London outwards. There are no records this year from V.C. 19 or V.C. 24.

V.C. 16, West Kent

The outstanding record of 2004 from inner London boroughs in this vice-county has to be Jon Riley's clustered clover *Trifolium glomeratum* from playing fields on Blackheath in **Lewisham**; when I lived just over a mile away in the mid 1960s, there was nothing more interesting there than *Plantago coronopus*, so presumably this scarce clover is increasing, or rather recovering lost ground, as there is a nineteenth-century record from the Heath (Cooper 1837: 47). It is just possible that either the modern or the older record is from **Greenwich**; at the other end of this borough, Ian Yarham found ten plants of cornflower *Centaurea cyanus* scattered along the bottom of a hedge alongside King John's Walk. This looked very different from the usual modern occurrence of this former cornfield weed, but I still doubt that it was any more genuinely wild than the two plants of it, together with eight of corn marigold *Chrysanthemum segetum*, on a soil barrier placed across the road behind Morrison's supermarket at Erith, reported by Margot Godfrey. Much more significant records than the last from **Bexley** are the heather *Calluna vulgaris* and sessile oak *Quercus petraea* seen in Lesnes Abbey at our meeting of 20 March, as neither of these valuable indicators of former habitat was mentioned in such documents as the schedule of sites of nature conservation interest in Bexley based on the borough's wildlife survey in 1991. Another significant indicator plant was slender spike-rush *Eleocharis uniglumis* found by Joyce Pitt in the grazing marsh south of Crossness, in what is probably only its second extant London station; the plant has long since gone from Foots Cray Meadows, where Francis Rose found it in 1955. **Bromley** had some records from the BSBI's Local Change survey in the second of its two years. My best find in the Biggin Hill square was a field border with good numbers of smooth brome *Bromus racemosus* and loose silky-bent *Apera spica-venti*, and in the Chislehurst square a small group of plants of the corky-fruited water-dropwort *Oenanthe pimpinelloides*. This is only a mile or so from the very large colony of this supposedly rare umbellifer in Jubilee Park, but it was a much greater surprise for Geoffrey Kitchener to find it in and near to his Local Change square at the edge of the borough near Knockholt Station and more extensively across the road and on the golf course up the hill in Kent. Other plants from this square were sea fern-grass *Catapodium marinum* on the verge of the salted A21 and

southern marsh-orchid *Dactylorhiza praetermissa* and its hybrid *D.* × *grandis* in the road drainage lagoon by Hewitts Roundabout.

Other finds by Mr Kitchener in the **Kent** part of this square include a total of twenty fly orchids *Ophrys insectifera* near the railway, a large colony of yellow vetchling *Lathyrus aphaca* along the Sevenoaks Road and four plants of Argentinian vervain *Verbena bonariensis*, which is well-known as a self-seeder in gardens but very rarely seen out of them, on a cleared roadside area. At the edge of a hay field near Halstead he found a group of about sixty plants of heath cudweed *Gnaphalium sylvaticum*, the first certain record in our area of this much decreased species since 1965. On Greatness clay-pits he came across narrow-leaved bird's-foot trefoil *Lotus glaber* and six plants of golden dock *Rumex maritimus*, one of them very large. Another much decreased species is yellow bird's-nest *Monotropa hypopitys* which I saw by the railway south of Eynsford, following directions from Dave Johnson who had come across it in the course of his investigation of the population here of green-flowered helleborine *Epipactis phyllanthes*, of which he counted a total of fifty-eight plants, some of them on the roadside bank; the other population of this species in our area, in Craylands Gorge near Swanscombe, originally a cutting for a mineral railway, is much finer with 210, on average much larger than those at Eynsford. By far the most intriguing record from the Kent part of our area in 2004 was John Palmer's report, already published in the *Bulletin of the Kent Field Club*, of sticky stork's-bill *Erodium lebelii* on Green Street Green near Dartford. The distinctness of this plant vis-à-vis the more variable common stork's-bill *E. cicutarium* has not been universally accepted, but seems fairly obvious when its small pale pink flowers are observed on loose sand dunes; the best characters are those of the fruit, which Mr Palmer did not observe in this rather different though still sandy habitat. He also reports dark mullein *Verbascum nigrum* and white mullein *V. lychnitis* from various localities around Darenth — in one the former was 'the only plant not eaten by horses' — *Rosa wilmottiae* abundantly naturalized on chalk slopes below Ladies Wood, and decidedly unusual maritime plants for salted roads common scurvy-grass *Cochlearia officinalis* and greater sea-spurrey *Spergularia media* by the A225 north of Farningham. Geoff Joyce sent me a very interesting plant list for the Jeffery Harrison Nature Reserve near Sevenoaks at the edge of our area, including a single green-winged orchid *Orchis morio* on a steep sandy slope and pennyroyal *Mentha pulegium* in mud at the edge of a gravel-pit lake. In other localities, Dr Joyce found hairy buttercup *Ranunculus sardous* in a horse-paddock near Bradbourne Lakes and fly orchid and greater butterfly-orchid *Platanthera chlorantha* at Magpie Bottom.

V.C. 17, Surrey

Dr Joyce found deadly nightshade *Atropa belladonna* in a shrub border outside **Southwark** Cathedral; our records from this area, where it was perhaps first present as a cultivated medicinal plant at Guy's Hospital, go back at least to 1977, but there have been none for a few years. John O'Reilly, in his report of star-of-Bethlehem *Ornithogalum umbellatum* from Vauxhall in **Lambeth**, referred both to the statement by Stace (1997: 931), that this garden escape with larger more numerous flowers is clearly different from the native *O. angustifolium* with up to twelve flowers having perianth segments not exceeding 20 mm in length, and to the long list of vice-counties in the *Vice-County Census Catalogue* (Stace et al. 2003: 361) with *O. angustifolium* as an introduced plant; what has happened is that all previous records of *'O. umbellatum'* have been assumed to belong to *O. angustifolium*, with the exception of one where it was possible to check the chromosome number, which also differs between the two. From **Wandsworth**, Barry Nicholson e-mailed me a photograph of a mystery plant on Tooting Bec Common which I recognized as the garden annual meadow-foam *Limnanthes douglasii*, and on Putney Heath Ian Kitching identified for himself purple iris *Iris versicolor* in the

water of King's Mere with the yellow iris *I. pseudacorus*, and *Anthemis austriaca* by a path; it is likely that both are deliberate introductions, the latter as an unintended substitute for corn chamomile *A. arvensis*. In **Merton**, Dr Kitching found the grass *Achnatherum calamagrostis*, which is occasionally cultivated for ornament, on a pavement in West Barnes, and thread-leaved water-crowfoot *Ranunculus trichophyllus* in a recently cleared ditch on the golf course on Mitcham Common. He reports California brome *Ceratochloa carinata* from four places in his home borough and one in **Kingston upon Thames**, so it is evidently continuing to spread southwards through suburban London. His single large plant of musk stork's-bill *Erodium moschatum* on waste ground near the superstore in Purley Way is the only record of this increasing species (Burton 2005) from **Croydon** so far. At the edge of Beddington Sewage Farm in **Sutton** Dr Kitching reports what I am sure he has correctly identified as field pepperwort *Lepidium campestre*, but its warty fruit had a style far exceeding the notch at the tip, which is contrary to published descriptions of the species. I saw Steve Gale's photograph of ivy broomrape *Orobanche hederae* from a colony in raised beds by the Brighton Road, which is not the well-known population of this plant from the borough. Another of Mr O'Reilly's records of *Ornithogalum umbellatum* was from Old Deer Park in **Richmond upon Thames**. This was with Clare Coleman, and in the same borough they found large-flowered cockspur-thorn *Crataegus coccinioides* on Ham Common; remarkably, this is only the third London locality for this readily bird-sown ornamental tree. Richmond Park is well known botanically, so Robert Hutchinson's first record from the Park of small cudweed *Filago minima* is very surprising, especially as there were over a hundred plants along a path.

Beyond the London boundary in **Surrey**, Steve Gale saw abundant corn marigolds at Mercer's Farm, Nutfield, and Mr O'Reilly and Mrs Coleman found garden rocket *Eruca vesicaria* and annual yellow woundwort *Stachys annua* in Butcher's Grove, part of Horton Country Park in a Local Change square; their identification of both was confirmed by Eric Clement.

V.C. 18, South Essex

All the records from this vice-county which I wish to mention here are from the 10-km grid square TQ58, either from the London Borough of **Havering** or from the Thurrock unitary authority, and with the exception of the fiddle dock *Rumex pulcher* by the Upper Rainham Road alongside Dagenham Chase which Jane Woodliff sent me herself all were communicated to me by Mary Smith, who is evidently coordinating the records from this square for the new Essex flora. She has accumulated an astonishingly large number of species not listed for the square in the *New Atlas* (Preston et al. 2002). Some of these are escapes from cultivation which have in the past been better recorded elsewhere, but I do not have a previous record from London either of the obedient-plant *Physostegia virginiana* which she found in Cranham or giant fennel *Ferula communis* from Dennises Lane, Upminster. The latter is at the very edge of London almost under the M25, and it is an interesting field for speculation how its large flattened seeds could have been transported by road either from its well-known site by the A11 in Suffolk or from elsewhere, perhaps on the Continent. New native plants for the square include hair-like pondweed *Potamogeton trichoides* in a little fishing pond east of Albyns Farm, grey club-rush *Schoenoplectus tabernaemontani* in a small pond on Cranham Brickfields and woodruff *Galium odoratum* in a small copse south of Gaynes School, Upminster; at least the last is unlikely to be native where seen. Mrs Smith, together with Ken Adams and Bob Creber, were involved in the discovery of a remarkable assortment of late-flowering hawkweeds on a slope west of Hacton Lane, Upminster, including over a thousand *Hieracium virgultorum*, a new species for Essex, a similar quantity of *H. salticola*, *H. sabaudum* and a group of *H.*

umbellatum. Mr Creber's independent discoveries include well-established Turkish iris *Iris orientalis*, cut-leaved dead-nettle *Lamium hybridum* and *Bromus hordeaceus* subsp. *longipedicellatus* from various places in the Hornchurch area. The last, a new subspecies of soft brome described only recently (Spalton 2001), has apparently not been recorded before in the London Area but may turn out to be quite frequent in hay fields. Surely the most unexpected record, another new species for the vice-county, is the white helleborine *Cephalanthera damasonium*, of which a single plant was discovered by Martin Higman and confirmed by Mrs Smith near the parish church of North Ockendon. Scarcely more expected was water avens *Geum rivale* on Cranham Marsh, surprising because the site was extremely well studied long before it became an Essex Wildlife Trust nature reserve. It can hardly be native here, and to complicate the matter further, the reserve warden, Tony Gunton, not only found it also by the pond at the end of his own garden about two kilometres away, but also found grass poly *Lythrum hyssopifolium*, another new plant for the vice-county, in the latter site.

Passing to **Thurrock**, by far the most important of Mrs Smith's finds is broad-leaved cudweed *Filago pyramidata*, of which at least 5,000 plants were seen north of the new A13 trunk road west of Davy Down. Together with another site in the area nearer Lakeside in TQ57, known for some years though not previously mentioned in this journal, this is now the largest concentration in Britain of this endangered (Cheffings and Farrell 2005) species. With it were *F. minima*, *F. vulgaris*, hoary cinquefoil *Potentilla argentea* and other unusual plants.

V.C. 20, Herts.

The field on the Barley-Mo Farm where David Bevan found *Legousia hybrida* in 2003 (Burton 2004: 238) furnished him in 2004 with further excellent plants: great brome *Anisantha diandra*, prickly poppy *Papaver argemone* and annual knawel *Scleranthus annuus*.

V.C. 21, Middlesex

About eighty yards from the front of St Paul's Cathedral in the **City of London** is about as central as one can get, which is where John Edgington found a plant of polypody *Polypodium vulgare*. I found another plant of probably the same species in the **City of Westminster**, on a beam above the track by Platform 1 at Baker Street Station. There have been a few remarkable records from Inner London boroughs. Claudia Watts reported a plant of common broomrape *Orobanche minor* in a patch of lawn in Capstan Square on the Isle of Dogs in **Tower Hamlets**. Mike Trier's photograph of pyramidal orchid *Anacamptis pyramidalis* on **Hackney** Marsh appeared in our *Newsletter*. Mark Spencer discovered what must surely be the largest population in Britain so far of early meadow-grass *Poa infirma*, perhaps half a million plants, on the Finsbury Estate in **Islington**. From **Camden**, Mary Clare Sheahan produced a specimen of an undescribed variant of ivy-leaved toadflax *Cymbalaria muralis* with pale cream flowers, near Russell Square. Narrow-leaved ragwort *Senecio inaequidens* has appeared spontaneously in two places in Camden, the Camley Street Nature Park reported by Dr Spencer and near the men's bathing pond on Hampstead Heath, communicated by Sir Charles Willink. By the railway tracks between Gloucester Road and Earls Court in **Kensington and Chelsea** Dr Kitching saw from a train numerous plants of small balsam *Impatiens parviflora* and small toadflax *Chaenorrhinum minus*. *Poa infirma* and *Senecio inaequidens* also had first records from **Haringey** reported by David Bevan, the former in hundreds by a track in Alexandra Park, the latter about thirty plants on Cranford Way sidings, Hornsey.

Passing to outer London boroughs, John Rogers told me that two plants of greater burnet *Sanguisorba officinalis* had appeared ten feet apart in a jungly front garden near his house in Mill Hill in **Barnet**. This distinctive and uncommon plant does occur within a couple of miles, in ancient grassland, but

nothing explains how it reached this very different habitat. **Harrow** has much of a Local Change square. The meeting I led in June turned up the American grass *Stipa tenuissima* on a Pinnerwood pavement in this square; it has previously been seen in Britain as a wool alien but here it was evidently an escape from cultivation. Howard Matthews obligingly turned up the ferns *Polystichum setiferum* and *Dryopteris affinis* subsp. *affinis* on Pinner Hill golf course, but the best plants from there were supplied by the Hertfordshire botanist Gerald Salisbury late in the year. He reached parts of the golf course further from the path than I did, finding heather in perhaps the same place where it had been seen by Benbow in the 1880s or 1890s but nobody since, and also sheep's fescue *Festuca ovina*, pill sedge *Carex pilulifera*, heath-grass *Danthonia decumbens* and nodding bur-marigold *Bidens cernua*. In the **Hillingdon** part of the same square I found *Chaenorrhinum minus* as a railway weed. The Ruislip Natural History Society has embarked upon a resurvey of Ruislip Woods, to compare with that of Wrighton (1979). First results which have reached me are very detailed locations for rarer ferns from Mr Matthews, and a specimen of a tor-grass *Brachypodium*, known from Copse Wood since 1982, supplied by Colin Bowlt, which turns out to be *B. pinnatum* in its strict sense, with minute hairs on the lemmas and other characters to distinguish it from the downland plant which is *B. rupestre*. In **Hounslow** I observed dittander *Lepidium latifolium* by Feltham level crossing, exactly where it had previously been seen by Mr Clement in 1961 and Duggie Kent in 1968. The last Local Change square to be mentioned is partly in **Richmond upon Thames**. This includes Stain Hill Reservoirs, which were found in the previous survey (1987–8) to have a large population of the nationally endangered (Cheffings and Farrell 2005) species tower mustard *Arabis glabra*. I went there in 2005 with Joy and Pippa Hyde, and we found only one plant, on a bank otherwise covered in Japanese honeysuckle *Lonicera japonica*. Indeed aliens were a conspicuous feature of the reservoir banks in general; the most striking and unusual were a couple of very large bushes of sorbaria *Sorbaria sorbifolia* and a three or four square metre patch of Caucasian stonecrop *Sedum spurium*. Earlier in the year I had found a large plant of Corsican hellebore *Helleborus argutifolius* in an alleyway near the Thames in Hampton.

To collect and return the key for Stain Hill Reservoirs, I had to make personal visits to Thames Water offices at Staines, which gave me opportunities for some botanizing in that part of the vice-county which is now administratively in **Surrey**. My best find in May was a good spread of common ramping-fumitory *Fumaria muralis* subsp. *boraei* on the fence by the car park of Ashford Sports Club. In the marsh at the west end of Shortwood Pond in September I collected a small piece of a common plant whose variation I was studying, and later found caught up in it a fragment which Dr Cope of the Kew Herbarium confirmed was the frog rush segregate *Juncus ambiguus*. This has previously been collected four times in the vice-county, most recently in 1884. Normally it is found in saline habitats, and Dr Cope suggested that it may have been favoured by run-off from the salted A30 which passes close by.

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